COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER AND R. DAWSON HALL, *Editors.*

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New Relations and Permanent Peace

PUBLIC opinion is a powerful agent in shaping our conduct and our business. Public opinion has judged coal and found it wanting. The "man on the street," so often quoted, thinks there is something to the story that coal is controlled by a combine that boosts price, mistreats labor and rigs the supply to suit its fancy. Coal to the everyday consumer, to the householder or large industrial user is simply a matter of necessary expense, borne grudgingly. The press agents of coal have been men like Senator Calder, whose words of condemnation have carried the breadth of the land.

Mr. McAdoo has told the country that the coal operators make a thousand per cent profit in their business; Senator Calder has said that the coal men pass the cars around and add dollars and dollars to the price in the process; Herbert Hoover announces that the bituminous coal industry is the "worst functioning" of all large business; Dr. Garfield has recommended that there be some form of supervision of the industry; the public utilities tell the people that they must double their charges for light and trolley-car tickets because the coal man is getting all their money, and the railroads blame the increased cost of coal for a substantial part of their deficit. And there is a grain of truth in what every one of these has told the public.

Throughout the years the men of the industry have been either complaining or explaining. Before the war they were complaining that they could not make a living wage for themselves and for their men and since the war they have been answering their critics with explanations—explanations that explain to those who want to listen to all the intricate details of labor costs, car shortages, marketing methods, investments and average returns, but explanations that interest not the layman because he is not educated up to balance sheets, subtle distinctions between contracts that are not contracts and reasons why he gets dirty coal and is told the cost cannot go down.

Why is a man proud of his gasoline bill and ashamed of his coal bill? Why is it a mark of distinction to have a shiny six purring at the curb on a nice spring day and but a sign of common thrift to have a pile of next winter's coal on the sidewalk? What is it that has brought the average man to a state of mind where he willingly shivers and lets his guests shiver, as long as he has Persian rugs on the floor? Is there not something wrong when coal is looked upon as a necessary expense and these other things as necessary luxuries? The manufacturers of asbestos are capitalizing the idea that coal is just an expense that should be eliminated as far as possible. Coal is something bought by the ton and dumped in the back yard.

Coal is heat and heat is comfort; but who but the makers of radiators and furnaces for the parlor has ever attempted to popularize the comfort of heat? Why should those who produce and distribute anthracite be so indifferent to what people think of them and their product, unless they are content in their knowledge that there is no substitute for hard coal? And if they are not indifferent, what evidence is there of their concern? In the Middle West the best selling argument for the product of the largest distributor of bituminous coal for house use is that its product looks like anthracite. Two scuttles full of coal—"who can pick the anthracite from our chestnut?"

Coal is power. The mighty engine thundering over the rails, the giant liner plowing through the ocean waves, the shifting spindles of industry are propelled by the letting loose of the pent-up energy of coal. But who has ever made us visualize coal as the Atlas holding up the world, or the Hercules performing the arduous tasks for man, or the fleet-winged Mercury carrying our messages across the continents and around the world? Coal is so necessary that it is commonplace; so essential that through its lack we stopped the United States for five "heatless days."

The coal industry has been complaining and explaining because it is on the defensive. Public opinion is centered on just one thing about coal and that is the profit taken by the men who engage in its traffic. All the controversies in the halls of the Congress have waged around that theme and all the efforts of the coal industry have been to explain and justify their action in taking a profit. For every outrageous story about coal we have at hand a perfectly lucid explanation, supported by uncontrovertible facts. We can disprove Mr. McAdoo's fairy tale, we can find more honest men in the industry than Mr. Calder can scamps, we can show Mr. Hoover other industries as poorly managed as coal, we can tell Dr. Garfield that it is not fair to pick on coal alone of all the essential industries and we can show the public utilities and the railroads why coal must cost money, but we have not changed anyone's ideas about what is the trouble with coal.

The only time the coal industry ever went before the people of the nation with a story, it was to throw a scare into them. The "Buy Now" campaign of the National Coal Association in June, 1919, was fully warranted in the circumstances, was well conceived and has been amply justified by subsequent history. Notwithstanding, the association has been publicly accused and has had to defend itself against the charge of having undertaken that campaign from motives of profit. The success of that single attempt to influence public action was sufficiently clear to show what can be done in other directions.

Irregularity of operation and inflated mine capacity are the chief causes of trouble to the bituminous coal

industry. Traced to its cause we find that irregular operation, high and low spots in production and prices, are responsible for the existence of too many mines. Irregular operation in turn is the result of irregular demand. In 1914 and in earlier years the coal operators were the ones to suffer from this condition and they turned to Washington and sought from the Federal Government some form of relief. In the past few years it has been the consumer who has suffered, and he in turn has appealed to Washington. The weight of public opinion was against any form of combination in business or even co-operation under the protecting wing of the Federal Trade Commission in 1914, but the weight of public opinion is not so clearly set against some form of regulation of the coal man in the supposed interest of the consumer. And yet the remedy, if remedy there be, lies with the consumer of the coal, not with the coal man or with the government. No law that could be put on the statute books will make one buy coal, and some of the laws that have been proposed would have the opposite effect in such a time as this by lulling the consumer into a sense of false security.

If furs can be sold to the people in the summer time and ice in the winter is there not something that can be done to move coal with less regard to season? We have heard much about developing a merchandising program for coal but Mr. Cushing in his Atlantic City address in December, 1920, told us that in two years he had only got so far as to consider whether or not there should be a simple, standard figure representing the jobber's commission and whether or not that should by fifty cents! No suggestion of whether the compensation should not vary with the service; just a question of the profit—a standard wage for every man with a union card.

The winter campaign is closed; General Frelinghuysen and General Calder on the one side and General Coalman on the other, are digging in and gathering their respective forces for the spring drive. The campaign of last winter found the forces of coal on the defensive, without unified command and sadly in need of ammunition. Back of the other side is a strong public opinion that will produce a new leader, or better said, a follower, for every one that is lost or driven out. The better strategy would then appear to be to consider the public behind Congress. A change in the attitude of coal toward the public and in the relation of the public to coal is the surest way to permanent peace.

Merchandising Replaces Transportation Saving

PUTTING a certification of quality on their coal equivalent to the guaranty of a steel producer on his product, shippers of coal produced in the New River Field of Virginia on the Virginian Ry. have subordinated individuality to the cause of uniform and perfect product. Few realize on the first reading of the statement by J. S. Burrows, consulting engineer on coal classification for the Sewalls Point Coal Exchange, *Coal Age*, March 17, page 509, that something altogether new in the classification of coal as a guaranty of product has been put over by this exchange.

The original method of classifying and pooling coal at Tidewater had for its purpose the reduction of car detention—that is, the saving of transportation. Grouping the mines was simply a means of reducing the number of "classifications" and was but an incidental though necessary step in the program. The new system of tidewater classification developed by the Sewalls Point Coal Exchange has for its purpose standardization of product and the absolute guaranty of quality. Under the original system, and it is a system yet in use by all exchanges save that at Sewalls Point, the only guaranty offered the shipper is that the coal he gets in his boat comes from a certain list of mines. The exchanges have never told anyone what kind of coal is included in any given classification. During the war and last year it was not necessary in order to sell the coal to go into much detail with respect to whether or not it would burn. Conditions have changed. Consumers now are picking and choosing their coal, and there are now thase to whom it is not sufficient to quote pool 1, pool 9 or pool 37, but who in addition require to know something about the quality of the coal.

The new system of pooling is, rather than specify what mines will furnish the coal in a given pool, to say what the coal in that pool is. In other words, the new idea in pooling is based upon the merchandising of coal and not on the saving in transportation. Mr. Burrows comments on the "foresight of the group of coal operators who, nine months ago, in the face of an unprecedented demand and high prices, required that, regardless of individual consequences, their coal be classified on its merits as determined by test." The machinery developed for protecting the integrity of the new Sewalls Point pools is such that the shipper from every mine on this railroad has not only been willing but anxious to avail himself of the exchange. The membership is 100 per cent; none can afford to stay out.

The Tidewater Coal Exchange, Inc., operating at the ports of Baltimore, Philadelphia and New York, and the new South Carolina exchange have called in the Bureau of Mines, as did the Sewalls Point Exchange, for assistance in sampling and testing the coal from the classified mines shipping into the different exchanges. The problem of the Northern exchange, however similar in principle to that of the Virginia shippers, is infinitely more complicated in detail. There are about 1,800 mines classified for shipment into the pools at the three Northern ports; the coals range from low through medium to high volatile, compared with one low-volatile coal at Sewalls point. Compared with one pier at which the Sewalls Point exchange has erected a large scale sampler the Northern shippers have five piers at Baltimore and Philadelphia, in addition to half a dozen in New York Harbor.

The praise that goes to the Virginia shippers is for pioneering, that to the Northern shippers for undertaking the bigger job. We trust that they will see it through.

WHEN ABRAHAM LINCOLN was a young man he ran for the Legislature in Illinois, and was defeated. He next entered business, failed, and was seventeen years paying his debts.

He was engaged to a beautiful woman—she died.

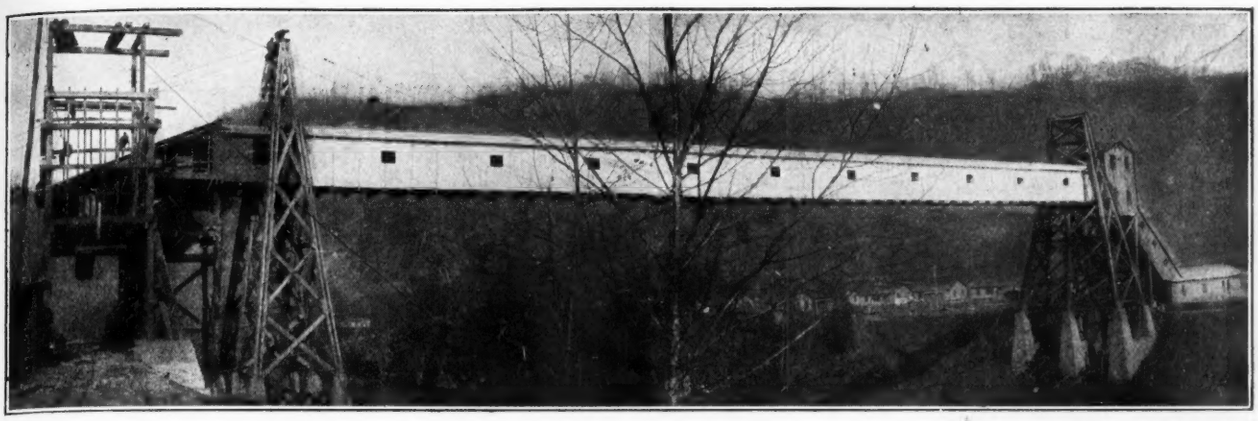
Entering politics again, he ran for Congress, and was again defeated.

He then tried to get an appointment in the U. S. Land Office, but failed.

He became a candidate for the United States Senate, and was badly beaten.

He ran for Vice-President and was once more defeated.

When the coal market is dull, think of Lincoln.



SUSPENSION BRIDGE 65 FT. CLEAR OF THE RIVER CARRIES BELT CONVEYOR BY WHICH COAL IS TRANSFERRED

Belt Conveyor Transfers Coal Across River With Suspension Bridge as Support

With the Mine on One Side of the River and the Railroad on the Other It Was Necessary to Move the Coal Across the Stream Without Interfering with Navigation—This Was Accomplished by Means of a Suspension Bridge Carrying a Belt Conveyor

BY R. W. SHUMWAY*
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OF THE many installations completed in the eastern Kentucky coal field during the last year, the plant of the Eureka Coal & Mining Co. located at Prestonsburg, on the Big Sandy Division of the Chesapeake & Ohio R.R. and completed Feb. 1 of this year, is one of the most interesting. This firm has successfully developed a large tract of coal land lying on the opposite side of the river from the railroad, and has built a suspension bridge crossing the stream to support a belt conveyor, which carries coal from the tipple house to the screens and bin on the railroad siding.

The plant was designed and built to handle without expansion of the bridge structure the whole tonnage that will be produced by the operating company from its present acreage and from any coal holdings that it may later acquire. Its capacity is 250 tons of mine run per hour, and this output the management expects to produce within two years. This will make this plant one of the larger producers in the field.

A multiple-bucket aërial tramway was first considered for this property, on account of its lower installation cost, but this idea was abandoned in favor of a suspension bridge carrying a belt conveyor, for such a combination would afford a larger capacity and lower operating expense.

BIG SANDY AT PRESTONSBURG 200 FT. WIDE

With the exception of the suspension bridge itself, which was designed by the Leschen Rope Co., the entire plant was planned and equipped with machinery by the Link Belt Co. of Chicago. The conditions which determined the selection of the system of conveyance are, briefly, as follows: A coal bed lying on a level with the railroad but across the river from it, with 600 ft. between the outcrop and the river bank. The river, the Big Sandy, is 200 ft. wide at this point, with steep banks about 40 ft. high. The railroad, at the center line of the bridge, is cut through a rock cliff, practically at the river's edge, so that, between the railroad and the stream, but little room was available for trackage or tipple.

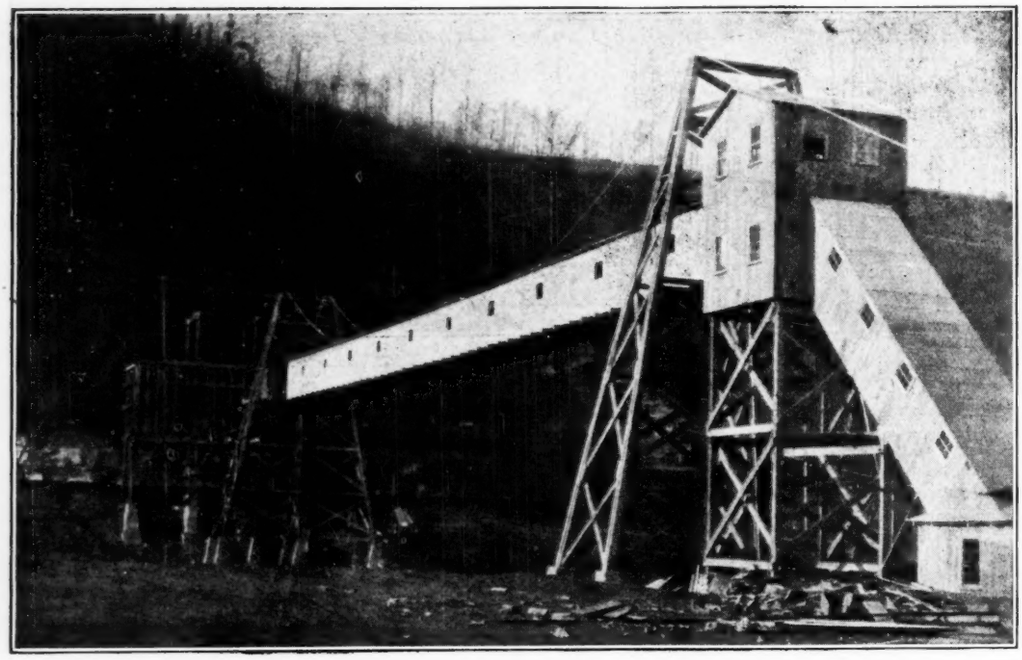
As the road is now built, the coal from three mine openings in the Miller's Creek bed is hauled by combination trolley locomotives to a central tipple located near the river bank, where it is weighed and discharged by a Phillips cross-over dump, which delivers to a small bin. Thence it is fed over a reciprocating-plate feeder to a flight conveyor built at an inclination of 45 deg., which in turn discharges it over a lip screen to the belt conveyor. The flight conveyor is 101 ft. 6-in. from center to center with 23-in. pitch chains carrying 15 x ⅛ x 36 in. steel flights and having a capacity of 250 tons per hour at a speed of 90 ft. per min.

SCREENED SLACK USED AS BED FOR LUMP COAL

The lip screen is introduced between the flight conveyor and the belt, to screen out part of the slack coal. This falls directly onto the belt and forms a cushion for the lump coal, thus protecting the belt from undue abrasion. The belt is a 36-in. 6-ply rubber band, running at a speed of 250 ft. per min., over flat Uniroll idlers, having a slight flare at the ends. The belt lies practically level across the idler, yet does not show the usual tendency to spill coal over the sides. The tendency to spill which most belts show is as a rule prevented by the use of three- to five-roll troughing idlers.

Mine-run coal is discharged at the railroad end of the belt and screened over a stationary lip screen, which

*Constructing engineer.



View from Mine Side

Coal is dumped on mine side of river into a bin, fed to a reciprocating-plate feeder which discharges on a 45 deg. flight conveyor. A 36-in. belt carries the coal across the river where it is loaded into railroad cars.

separates the coal into slack and 4-in. lump. The lump goes directly to the railroad car, and the undersize is raised in a bucket elevator to a storage bin of 150-ton capacity, placed over the single loading track and about 25 ft. to one side of the tipple. Should additional sizes be required, an additional track may later be built for loading lump coal.

The belt conveyor is 80 ft. above low water level in the river, that clearance being demanded by the U. S. War War Department, which classes the Big Sandy at this point as a navigable steam. This height is demanded for the unobstructed passage of boats.

Belt Conveyor Carried by Suspension Bridge

The span of the bridge is 250-ft. This length is carried by two latticed wood towers, one on each river bank, each tower being 65 ft. high from foundation to the center line of ropes. The entire bridge is suspended from two 2-in. galvanized-steel carrying cables, the rope stress in each cable being 110,000 lb. The cable anchorages are concrete blocks having a dead weight of over 100 tons.

The west anchorage is in the cliff back of the railroad and was especially difficult to install, as the sandrock was disturbed by fissure or "hill" seams at fairly frequent intervals. These extended to a thin coal bed some 15 ft. below the top of the anchorage. On this account it was thought advisable to extend the anchorage excavation beyond these seams until solid rock was reached, and bed the anchors at that point. To accomplish this, a 5 x 14-ft. tunnel was driven 20 ft. into the hill, then the anchors were placed and practically the entire tunnel then filled with concrete.

As this tunnel was 25 ft. above the railroad and the concrete mixer, it was expected that the placing of 50 cu.yd. of concrete, without special facilities for doing the work, would prove to be a slow and expensive process. However, a small single-drum contractor's hoist was available and accordingly a small rope was anchored above the opening and the concrete poured into a half barrel, which was then hoisted and tipped by hand into the tunnel, which fortunately was driven steeply downhill, to roughly correspond to the pitch of the bridge-supporting cables. In this way 50 cu.yd. of concrete was placed at the rate of 10 cu.yd. per day, using a total labor force of ten men, which fed the mixer, wheeled and placed the material with one man at the hoist.

Reinforced Concrete Footings Under Towers

The foundations of the bridge tower also were difficult to construct, as they were both placed directly at the river bank. This made it necessary to dig deep excavations on both sides of the river. On the mine side a sandy clay was found as a subsoil, which made an excellent foundation. Three concrete footings were used as tower bases. These were reinforced with 30-lb. rail placed at 2-ft. intervals, horizontally. Upon these footings stone piers were constructed for the tower supports.

On the railroad side of the river the site for the piers was found to be a loose, rock fill, being the waste from the original railroad-cut excavation. This was shot and quarried out until an area of sufficient size was made for a footing course 24 x 56 ft. over all. This area was then covered with a slab of concrete reinforced at 2-ft. intervals with 30-lb. steel rail.

The tower piers were then built of concrete upon this base. This was all later covered with débris from the tipple-pier excavations. As completed the tower piers are quite substantial, containing nearly 400 cu.yd. of concrete for each tower. They can carry with safety several times the load that will be placed upon them.

Construction Details of Suspension Bridge

The bridge itself is a light frame structure suspended from the two carrying cables by ⅞ in. Earnst hanger rods placed on 5 ft. 6 in. centers. Oak stringers 6 x 10 in. in dimensions are attached to the hanger rods and form the main bridge stringers. These support the girders of 6 x 10-in. oak, on which are placed 3 x 8-in. oak deck sills on 4-ft. centers. The lateral X-bracing is of 2 x 8-in. oak, bolted to the main stringers, while 3 x 10-in. stringers are used for the belt idlers, which are placed in the center of the platform with a decking laid on either side.

The entire structure is covered with corrugated iron attached to ordinary balloon framing. Three ¾-in. steel-cable guy ropes are attached to each side of the bridge at the center and quarter points. These are provided with turnbuckles at the shore end. Sufficient tension is taken to maintain the bridge in a true position under all weather conditions.

The bridge was designed for the following loads: Moving load on conveyor, 100 lb. per sq.ft.; wind on bridge for lateral system, 30 lb. per sq.ft.; wind on bridge for tower uplift, 60 lb. per sq.ft.; snow load, 25 lb. per sq.ft.; dead load, 360 lb. per sq.ft. The structure when completed was found to be quite stable and rigid, with practically no deflection under load and but little lateral motion under the action of heavy winds.

Hard to Determine Construction Camber

After the carrying cables were erected some difficulty was encountered in determining the amount of camber to leave in the unstretched ropes, so that when the weight of the bridge and loaded belt was applied the stretch should be sufficient to allow the belt to assume a true horizontal position without sag. No data seemed to be available that would cover the conditions of an unloaded rope in this position, making allowance for sag in the rope between tower and terminals, slight kinks or waves in the cable due to its unstretched condition, the flatness of the curve in the rope over the tower saddles arising from the same cause and finally the gradual stretch in the cable itself as the load was applied. The last item appeared to be the only one that could be calculated with any degree of certainty. As the bridge was erected in cold weather, the temperature in summer would also affect the sag of the bridge.

It was found impossible to determine these various factors and a camber of 12 in. was allowed in the unstretched ropes, on the assumption that this would be taken up under loading. Threaded U-bolts were used on both ends of the cables to take up any sag that might develop later. This allowance has proven to be fairly satisfactory, as the bridge now is almost level, with but 4 in. of sag, in an unloaded condition. When the belt is full of coal the sag apparently is not increased, as no additional deflection can be detected with an engineer's level. This 4 in. deflection will be taken up later by screwing up the U-bolts at the end of the ropes and by threading up the hanger rods.

The entire tipple structure is of oak and of standard construction. It is supported on concrete piers. The driving machinery for the feeder and flight conveyor is placed below ground in a 25 ft. excavation inclosed by 36 in. stone walls. In this pit a small quantity of water gathers daily and a small pump connected to the feeder drive is provided for its removal.

A New Non-Freezing Military Explosive and Its Application to Mining

Extensive Government Tests Establish the Stability of the New Powder as Well as Its Great Rending Power—Shells Torn to Pieces and Warped by the Firing of One of Them Did Not Themselves Explode—Powder Can Be Set Off Only by Detonation

By Dever C. Ashmead
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IN ONE of the reports of the U. S. Army Ordnance Department occurs the statement: "Thus was born the only distinctively new military explosive developed in America or Europe during the world struggle." This sentence refers to an explosive developed by the Pennsylvania Trojan Powder Co., of Allentown, Pa., and San Francisco, Cal., this explosive being known as Trojan powder.

Although this powder is new from the military standpoint, it was discovered previous to the war and has been used commercially for the past eight years. Before we take up its value from the commercial standpoint, however, it might be well to see what it accomplished during the war and how the advantages that it then showed are applicable to commercial pursuits. The information here set forth has been obtained not from the manufacturer but from reports of the government.

This new explosive, which is highly economical in use, dispenses with glycerine, and the base of its manufacture is not a fat from which glycerine may be derived but a product obtained from two of America's greatest cereal crops, viz., corn and potatoes. The process of manufacture is, of course, secret. During the war 7,244,569 defense hand grenades, 1,526,000 offense hand grenades, 9,921,533 rifle grenades and 813,073 3-in. trench mortar shells were loaded with this powder.

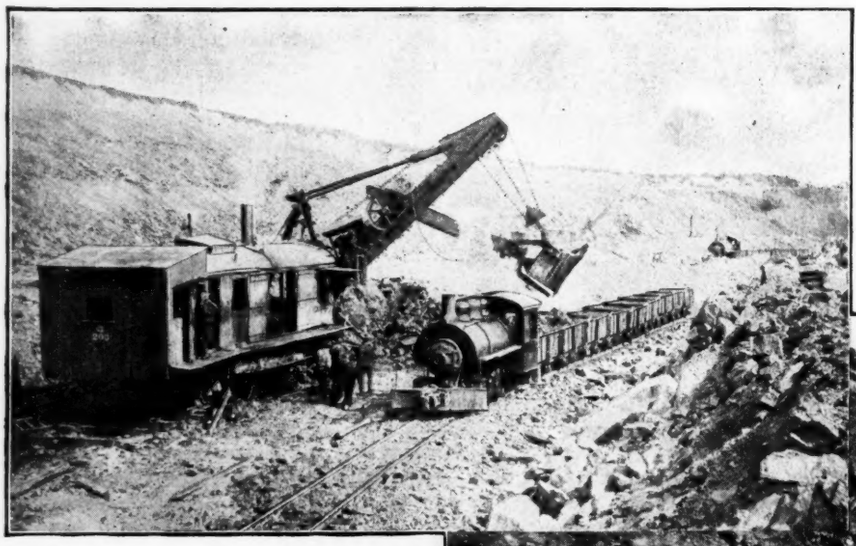
Fragmentation and penetration tests, as conducted by the government, proved conclusively that better results were obtained from this than from any of the other explosives used. This shows that a greater explosive force is inherent in this powder than in other high explosives.

Shells Torn to Pieces But Did Not Explode

As the next statement is little short of astonishing, it is quoted verbatim from page 34 of bulletin 2,030 of the Army Ordnance Department: "It was required that the powder should be immune against an enemy shell that might be dropped upon an American ammunition dump. In the test fifteen bombs in five boxes were buried 6 ft. under earth and one of the number was exploded by a fuse. The force of the explosion tore five of the remaining fourteen to pieces and warped three more, but none exploded. The result was so remarkable that the experts insisted that these other bombs be fired in turn to see if they really contained powder. They were, and they did."

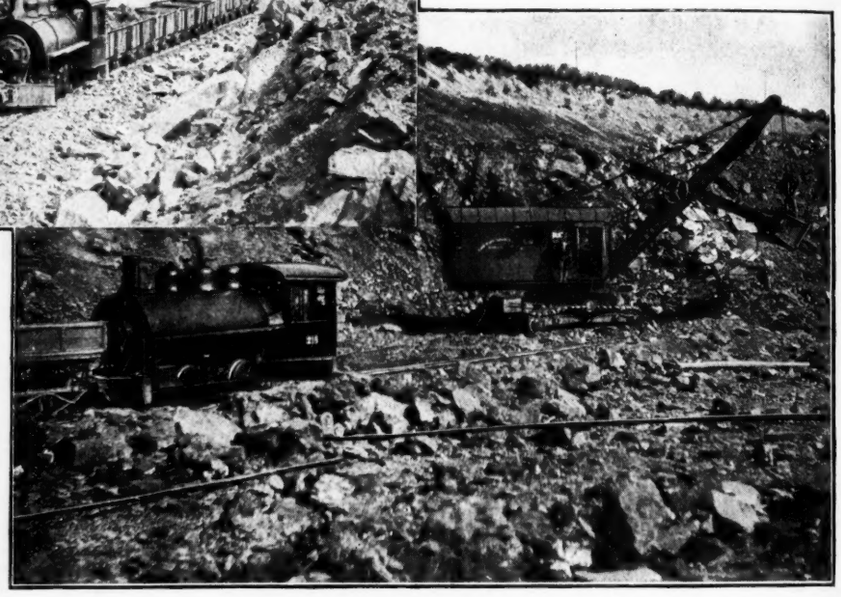
This powder has been used by the Locust Mountain Coal Co. for about four years, and the following information concerning it has been procured from this company. The powder cannot be fired by dropping the stick nor by shooting rifle bullets through the cases. It may, however, be fired when a detonator is placed in the stick and exploded. It is thus quite safe when properly handled and manipulated.

No matter how cold the explosive may become there is no danger in warming it, for the simple reason that it does not freeze. Consequently this danger, always present with some of the older type of explosives, is entirely eliminated. The coal company above mentioned has had excellent opportunity to test this quality of the Trojan powder, as it has one of the largest open-pit strippings in the anthracite region and has used many carloads of the explosive in winter and summer.



Loading in Open Cut

This view was taken in a large anthracite strip pit, where many tons of the new non-freezing explosive are used annually.



Another View in the Same Pit

This little electric shovel is digging blasted rock. The rending effect obtained may be judged by the condition of the material in which the machine is working.

In the quotation above, taken from the government report, it was shown that one bomb could be exploded beside another without detonating it. In other words, each stick has to be in almost actual contact with its neighbor in order to fire it, the jump gap being extremely small. This fact greatly increases the safety with which it can be used in mining operations.

Gases Given Off Do Not Cause Headache

The bad odors and fumes that follow the detonation of certain explosives keep men out of the working places for appreciable lengths of time, for if they returned to work they would soon become nauseated or acquire an intense headache. This causes a great loss of time and consequently a reduction in the output per man. The explosion of Trojan powder does not cause such fumes and consequent headaches.

While discussing this powder it might be well to mention some matters of interest connected with its use in quarries. This explosive is being employed with great success in limestone and cement-rock quarries, where it is commonly fired in holes from 60 to 120 ft. in depth. Detonation is here accomplished by means of a kind of fuse known as "cordeau." This detonating fuse consists of a lead tube filled with an explosive substance. Tests have shown that if a length of 17,500 ft. of it should be laid and one end fired by means of a detonator, the explosion would reach the opposite end in one second. This represents a rate of explosive propagation of more than three miles per second, and this quality has been taken advantage of in firing these holes.

When it is desired to fire a deep hole in quarry or surface blasting work, the first stick of Trojan powder lowered into the hole is attached to the extremity of a length of cordeau. The fuse thus reaches the bottom of the hole. The other sticks of explosive composing the charge are then placed in the hole, and a detonator is attached to the upper end of the cordeau fuse. This is fired by means of an electric battery. The explosion of the fuse, extending down the hole, detonates the sticks of explosive that it passes as well as the one into which it is inserted. This causes an almost instantaneous explosion, or one much more rapid than would occur if the bottom stick were fired first and the remainder of the charge detonated from its explosion. This system of loading and firing by means of the cordeau is said to give much better results than can be obtained from the same amount of explosive fired in the ordinary manner. It is meeting with considerable use in many large quarries.

Provisions That Enable the Skip Hoist at Coal Mines to Give Maximum Service

Where Skip Hoisting Is Employed the Bottom Layout Differs Radically from That Used with Cage Hoisting—Although Four Kinds of Dumps Are Available the Rotary Is the Variety Most Generally Installed

By Andrews Allen and John A. Garcia
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At COAL mines where sized coal is to be loaded the mine product should be dumped so as to pass in as direct a manner as possible from the cars into the skip, which accordingly must have a capacity that is some multiple of the capacity of the car used. Where cars are of moderate size and the shaft is not too deep, it is usually convenient and economical to use a skip that will hold two carloads of coal. With a two-car rotary dump, either one of two arrangements may be employed. In one the contents of both cars are thrown to each skip alternately; in the other each car dumps into a separate weigh pan or chute, the second dumping going on top of the first. This provides two carloads of coal for each skip, the operations being started with only a single dump in one of the two skips. The first arrangement is shown in Fig. 1 and the second in Fig. 2. Either of these plans eliminates the deep pit, reduces breakage, provides facilities for docking and for handling rock, and seems to meet admirably the conditions and requirements for coal mining.

For dumping cars at shaft bottoms where skips are employed for hoisting four devices are used: the cross-over dump, the kick-back dump, the bottom-dumping car and the rotary dump. The first two types require cars with end gates, which are, of course, objectionable. Such dumps are inexpensive, require no power and are easily installed. The cross-over dump is rapid. Neither of thse dumps, however, can operate in multiple or handle coupled trips.

The kick-back dump can be easily adapted to skip hoisting, one device of this kind being located in front of each shaft compartment. In this way skip hoisting may be installed in an existing mine without any radical reconstruction of the bottom.

It should be noted that the mine bottom for skip hoisting runs at right angles to the bottom designed for cages. It seems that driving new entries is the only convenient and economical way of adapting an existing mine bottom to hoisting by skip.

Place for Reliable Bottom-Dumping Car

A thoroughly satisfactory bottom-dumping car has, as yet, not been designed, although many types of such cars are in operation. All require on the car itself mechanism the cost of which is great if not actually prohibitive. In addition, bottom-dumping cars lack solidity and strength. They sometimes dump unexpectedly in the mine, causing wrecks; they spill more coal dust than cars with end gates; they are expensive to maintain, and frequently do not clean themselves readily, large lumps having a tendency to stick in them unless an extra-wide track gage is employed. If a satisfactory and economical bottom-dumping car should be developed, trips could be emptied without uncoupling or even without stopping. As a consequence the bottom layout could be correspondingly simplified.

Neither the cross-over dump nor the bottom-dumping car is adapted to installations where the coal is discharged directly from the car into the skip, and the kick-back dump is too slow or a mine having a large capacity.

The rotary dump combines every advantage of the types mentioned, except the ability to discharge a moving trip, which can be done only with the bottom-dumping car. It is capable of dumping with a minimum of breakage and is extremely rapid. It will handle solid-end cars in multiple or without uncoupling. It is rugged, simple, and free from operating troubles. Rotary dumps are used almost universally in England, where they are operated either by gravity or power or a combination of both.

Gravity Versus Power Rotary Dumps

The best gravity dumper is of the multiple compartment type. This is an excellent arrangement for small cars but it is not well adapted to an installation at a mine bottom on account of its large diameter and because it will not handle cars without uncoupling. The Hansen & Hayes gravity dump is rapid but difficult to handle and hard on the coal. The new gravity dumper, controlled by gears and a powerful hand wheel, seems to afford perfect control and for light cars of small capacity should give excellent service.

For cars of large capacity power dumpers are almost universally employed. Motor-operated dumps make a complete revolution; the reversing type, actuated by air or steam, revolves through 135 deg. to rest and then returns to its original position. The motor-operated design requires a large motor to take care of the peak load encountered in rapid operation. The stop at the end of a revolution is not absolutely positive, as it depends on a latch. These dumps are capable of handling eight to ten cars per minute and may be operated by either spur or friction gears from the motor.

The reversing type of dump is actuated by cable and air cylinder. Speed of operation is obtained with a comparatively low power consumption, as the air cylinder takes the peak of the load. A single dump of this type will handle up to seven cars per minute singly, or five cars per minute in trips. A two-car dump will handle from six to eight cars in trips and from eight to ten in pairs.

The Wood dump is operated by two single-acting air cylinders with tail-rope connection. These cylinders usually are set horizontally and fitted with equalized

*Second and concluding portion of a paper entitled "Skip Hoist for Coal Mining," presented before the American Institute of Mining and Metallurgical Engineers, New York, Feb. 16, 1921.

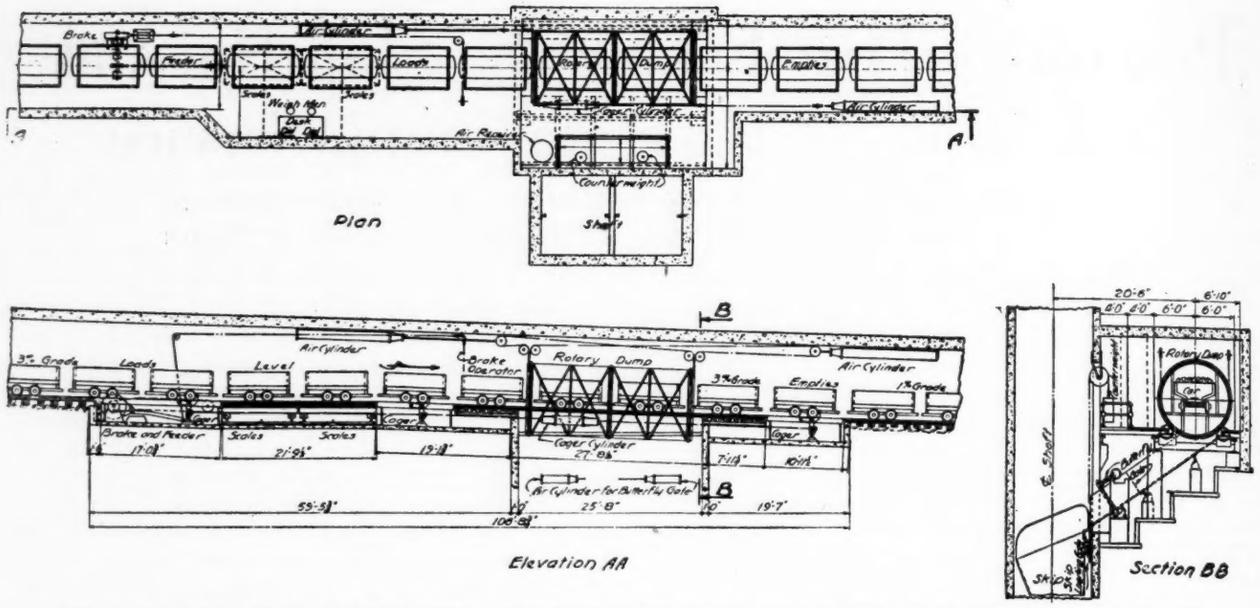


FIG. 1. LOADING STATION, KATHLEEN MINE, UNION COLLIERY CO., DOWELL, JACKSON COUNTY, ILLINOIS
Here, owing to the natural grade of the bottom, gravity with a retarding feeder conveyor is employed. Three men are needed, one to control the trip and operate the dump, one to weigh coal and one to pull checks and cut the trips below the dump into the required number of cars.

cables running to both ends of the dumping cage. The cylinders are operated by a four-way valve so arranged that one cylinder is filled with high-pressure air from the tank while the other exhausts into the atmosphere. When the valve is set near the cylinders and is sufficiently delicate in operation it is possible for a skillful operator to dump rapidly and with perfect control at all times.

He can cushion the dump so that it can hardly be heard when it strikes the stops, or he can give a blow when necessary to dislodge wet coal or rock. This type of machine handles the coal easily and without breakage. The cage is provided with a shield on the dumping side which delivers the coal to the chute without drop. The two-car rotary dumper of this type is now made with roller supports at the ends only, thus eliminating the expense of intermediate supports with their attendant, uneven wear and the necessity for adjustment of the wheels.

Where the skip contains three or more carloads and the bottom is laid out according to the system shown in Fig. 1, it is necessary to use a dump handling the number of cars corresponding to the skip capacity. Where the system shown in Fig. 2 is used, however, there is no change in arrangement and it is necessary only to provide a weigh pan of sufficient capacity and to arrange the scales for multiple weighing of the requisite number of cars.

Coal Weighed in Car or in Weigh Baskets

In most mining fields the coal is paid for by weight. Even where this system is not in use the tendency is to adopt it because it encourages the full loading of cars. The coal can be weighed on platform scales or in weigh baskets. The platform scale is the most usual arrangement, and in some respects is the simplest. The principal objection to the platform scale is the variation in the tare weight. Few mines, even new ones, have cars exactly uniform in weight or capacity. In the type of bottom shown in Fig. 1, arranged for a two-car dump, there should be two scales so spaced that two cars can be weighed while two are being dumped.

In the Kathleen mine of the Union Colliery Co. the trips are handled through the dump, without uncoupling, two scales being used. These are on a level grade and cager dogs are set above and below the scale, so that the couplings over the scale platform are slack. This method is thoroughly satisfactory but requires much mechanism and a long bottom. This can be avoided if weigh baskets are placed under the rotary dump. The weigh-basket arrangement shown in Fig. 2 is more elastic, simplifies the handling of cars, and will take care of three or four cars to the skip. The baskets are designed to stop the coal on a well-rounded surface and give an easy discharge without breakage. Though their use entails one additional handling of the coal, the resultant degradation is negligible.

Where two-car rotary dumps are used with a two-car skip the weigh basket is designed to hold two carloads of coal, each dump being weighed separately by means of a sliding dial scale or tare beam. The dumping does not have to register exactly with the hoisting cycle, as is the case where the other system is employed. The movement of the trip is controlled by one man, who also operates the rotary dump. One man weighs the coal and dumps the weigh pan. The safety gate automatically opens and closes with the skip.

Safety Gate Keeps Coal from Spillage

In Figs. 1 and 2 the sump is guarded by a safety gate, which is opened by the skip and closed by a counterweight when the skip ascends. It is not the intention that coal shall be dumped against this gate at times when the skip is not in the loading position. The gate, however, is in place should a dump accidentally be made, and can be used, in the weigh-pan design, to hold rock while coal is being placed in the weigh baskets. The safety gate also catches lumps of coal that are retarded in the chute and thus enables the operator to bell the skip away more quickly than would be possible without it.

In operation the cars or the weigh pans are dumped when the skip is approaching the bottom at such a time as will theoretically bring the coal to the skip as soon

as it lands. This is the most rapid operation possible, as the skip is then loaded in less time than when the coal starts from rest, as is the case when a measuring hopper is used or when the coal is loaded into the skip direct from a bin.

The safety gate shown in Fig. 1 has a spring catch with which the skip comes into contact, so that the gate floats down from the skip and opens the chute with little impact. A curved lip on the chute makes contact with the skip and prevents spillage. Fig. 2 shows a design that is better adapted for resisting the impact of coal and rock in case such materials are dumped against it. This type of gate is operated by a sword-arm lever, which is engaged by the operating roller on the skip. Its motion is conveniently adjustable and the lip projecting from the gate follows the skip down and gives a perfect discharge without any possibility of spillage.

Rock Can Be Handled in the Coal Skip

A moderate amount of rock can be handled at the skip shaft with either design, provided the hoisting capacity of the plant is proportioned for the rock in addition to the coal. This also necessitates a certain percentage of single-car hoists. The loss of hoisting capacity arising from the handling of rock without an auxiliary installation varies in the designs shown. In the case illustrated in Fig. 1 the worst possible combination of coal and rock is encountered when single cars of rock are interspersed with single cars of coal. In this case 5 per cent of rock will require 10 per cent additional hoisting capacity, compared with the coal. Where the rock cars in a trip are in pairs, between pairs of coal cars, a net increase in hoisting capacity of only 5 per cent is necessary.

In the case of the second design, or that shown in Fig. 2, the weigh pan would be left open when rock is hoisted, so that this material might pass down against the safety gate. The worst arrangement of rock and coal would then occur when two cars of rock were alternated with two cars of coal, as this would require single hoisting of both coal and rock with the same loss of capacity that would occur in the other case. Where single rock cars are placed between single cars of coal or the cars of rock are placed all together in a trip there will be no loss in hoisting capacity.

Rock Cars Can Be Segregated by Feeder

In this design the bottom is level and a reversing power-operated feeder is used for handling the trips. It is, therefore, possible to consolidate the isolated cars of rock or coal without loss of hoisting capacity, when they are within three cars of each other, by running the cars through the dump without discharging and returning them so as to select the rock or coal cars and dump them as desired. Where isolated cars of rock occur in the trip, it is necessary to discharge them singly, but the reversing feeder avoids the necessity of dumping single cars of coal when the rock and coal cars are not placed in correct relation in the trip. The dumper can easily take care of such problems, so that the actual number of single-car hoists will be few. The process can be greatly simplified by a little care in making up the trips on the partings.

Where large quantities of rock are to be handled or where the rock will not flow in a chute it must be hoisted at the auxiliary shaft, which is the only way in which a maximum coal-hoisting tonnage can be attained. If an auxiliary rock bin is built under the dump, with mechanical means for feeding the rock to the skip, single hoists of rock will not be necessary but the amount of coal handled will be decreased by the amount of rock hoisted.

In every case the proper handling of rock requires careful investigation. This problem, however, perhaps is easier of solution in a skip-hoisting than in a cage-hoisting plant, both on account of the greatly increased capacity of the skips and because there are always two ways of getting out the rock.

Docking facilities can be arranged by placing a special docking table in the tipple, onto which the contents of a single car may be hoisted and dumped through a fly gate in the chute. This table and the fly gate should be in charge of the dock boss, who can operate the gate and start and stop the conveyor at will, so that each car of coal sent for inspection may be thoroughly examined and the docked materials removed and identified. In practice a single car of coal will be hoisted whenever its condition is suspected, or the dock boss may be given all the cars he can handle in a day's run without unduly shortening the hoisting capacity.

Fig. 3 shows such an arrangement in the tipple together with the rock gate and chute. As the docking table discharges directly onto the feeder or screen, further handling of the coal is unnecessary. The docked material can be piled and labeled and afterward thrown directly into the rock bin. The operation of the tipple

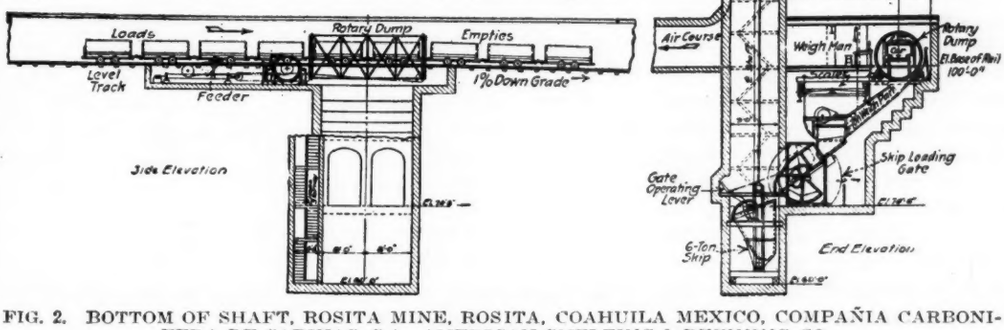


FIG. 2. BOTTOM OF SHAFT, ROSITA MINE, ROSITA, COAHUILA MEXICO, COMPAÑIA CARBONIFERA DE SABINAS, S.A., AMERICAN SMELTING & REFINING CO.

At this plant the bottom is level over the feeder, but down grade beyond the rotary dump on the track over which the empty cars travel. Note that the coal is weighed in a 6-ton weigh pan. The coal will be used largely for coking purposes.

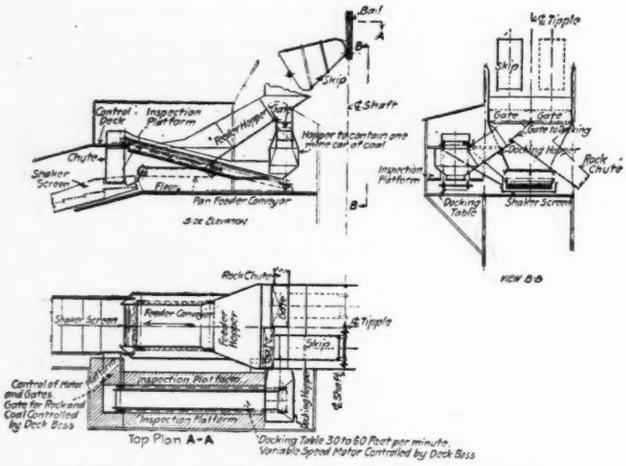


FIG. 3. DOCKING TABLE AT TOP OF SHAFT

The contents of a single car are hoisted and dumped through a fly gate in the chute. A picking table gives ample opportunity for inspection and raises the coal high enough for its delivery by a chute to the shaker screen which takes care of the uninspected skiploads.

will not be disturbed or delayed in the slightest degree.

The foregoing for the most part assumes that the cars are handled in trips without uncoupling, which method has proved successful. The labor of uncoupling cars and handling them singly or in pairs is not only expensive but dangerous. Furthermore, the ordinary handling of uncoupled cars through a dump or in a cage-hoisting mine is destructive to the cars as well as to the dump or cage and its mechanism. The only advantages of uncoupling are slightly greater elasticity of arrangement and a little higher speed in dumping.

Swiveling Hitchings Versus Swivel Drawbars

When cars are discharged without uncoupling, it is necessary to use some form of swivel hitching or drawbar. For a reversing rotary dump a three-link hitching properly designed will swivel through the necessary 135 deg., without sufficient loss in length to cause trouble. Swivel hitchings give good results for small cars and short trips, but when the swivel pin is large—say over 1¼ in. in diameter—the hitching becomes cumbersome and heavy. For large cars, either a swivel drawbar or a three-link hitching must be used. The spring and swivel drawhead shown in Fig. 4 has given excellent results and combines a spring both for tension and compression with a rugged and inexpensive swivel. The spring drawhead has special advantages where cars are dumped in trips, as the motion of the trip is effectively cushioned both in starting and stopping and the load is handled much more easily by the feeder.

The best arrangement at the foot of the shaft consists of a level bottom through the cage room and over the dump, but with a grade beyond the dump of about 1 per cent or less. The trips are then propelled through the dump, stopped and held in dumping position by a chain feeder operated by motor and brake set in the center of the track as shown in Fig. 2. This feed is reversible and the trip can be moved as desired, the cars stopped and accurately spotted by one man with the aid of no other mechanism. The grade of 1 per cent on the empty side keeps all couplings below the feeder in tension, so that, in dumping, the pins do not fall out and the cars are accurately spaced.

Where platform scales are used or where gravity is relied upon for moving the cars, cager dogs must be installed above and below the scale, and frequently below the dump. These dogs give slack couplings over the scale, as shown in Fig. 1, and a slack coupling below the dump where the trips can be cut apart.

Gravity operation of trips without uncoupling should never be attempted except with some kind of mechanical control. Where a two-car dumper is used, the trip must start from rest and run from 18 to 25 ft. into the dogs. A sufficient grade to assure prompt starting and reliable operation will give the cars an excessive speed when they enter the dogs on the dump. At the Kathleen mine (see Fig. 1), where, on account of the natural grade of the bottom, gravity operation was used, a retarding chain feeder was employed, similar to the power-operated feeder except that it was equipped with an air-controlled brake. This brake is applied after the trip gets under way and reduces the speed so that the trip lands in the cager dogs without excessive impact. Car retarders of the Fairmont type also have been used successfully for this purpose.

A power-operated feeder cannot be safely used with cager horns, unless such horns are mechanically interlocked. Successful plants have been constructed in this way, but they are quite complicated. Where the platform scales are omitted and the coal is weighed in baskets, the cager dogs are not necessary and the reversing feeder offers the most economical and effective means of handling the trips.

With continuous-trip operation it is possible to handle the bottom with three men—one to control the trips and operate the dump, one to weigh the coal, and one to pull checks and cut the trips below the dump into the required number of cars. The switches can be handled by this man or, in a large mine, by a special trip dispatcher. Where the trips must be uncoupled, at least two more men are necessary for this operation and for coupling up on the empty track. In a large cage-hoisting shaft mine, even with automatic cagers, at least two or three men are required at the bottom to couple and uncouple the cars; the weighman and check puller are located at the top.

Where the trips are uncoupled and a rotary dump is used, horns must be placed on the dump to hold the cars in proper position and some means must be provided for preventing the coupling pins from falling out. The impact of the cars against the dogs in the dump is destructive to the dump mechanism.

Auxiliary Hoist Shaft Essential at Big Mine

In a large mine an auxiliary hoisting shaft is necessary, especially with a skip installation. This shaft should be equipped with a small tipple, which can be used for handling coal during development and for hoisting whatever the main shaft cannot well handle.

In most cases a single counterweighted cage will be sufficient. This cage should be large enough to handle the mine equipment and to lower the men rapidly into the mine. It may be double decked, the upper deck being designed for cars and the lower for men only.

It may be noted that the use of solid-end cars in the rotary dump makes it impossible to use a self-dumping cage of the ordinary type at the auxiliary shaft. Formerly it was necessary to take the cars off the cage at the tipple landing and dump them singly in a rotary dump, or discharge them at the bottom into an auxiliary skip having a platform deck for the accommodation of men and material.

The overturning type of self-dumping cage has solved the problem of dumping at the auxiliary tipple. The

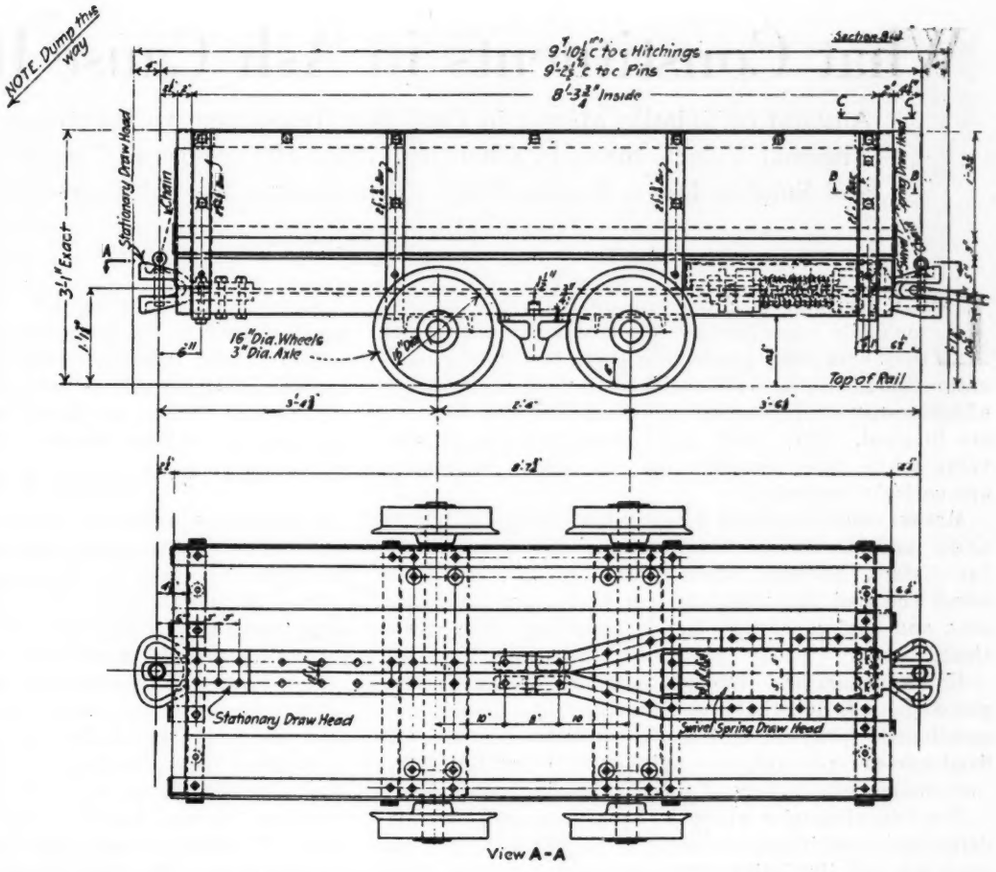


FIG. 4

Mine Car

This car has a swivel spring drawhead which provides both for tension and compression and for a swivelling connection between the cars, so that one or more of them can be reversed without disconnecting them from the trip. The spring drawhead has special advantages where cars are dumped in trips as the motion of the trip is effectively cushioned.

cage is a simple platform pivoted 3 ft. 4½ in. off center, the motion of the tilting platform being controlled by overhead rollers traveling in curved guides of large radius. Wheels pivoted on the tipple structure, over which the edge of the cage rolls when the rollers on the cage leave the circle guides, greatly shorten the dumping cycle and retain a large proportion of load on the cable, thus obtaining an easy dumping cycle under perfect control and a quick return of the cage into the shaft.

Cycle of a Self-Dumping Solid-Car Cage

The dumping cycle is arranged so that the edge of the car projects over the dumping plate just before the angle is reached at which the coal commences to flow from the car. As the dumping cycle progresses, the car turns over above the dumping plate with little drop until the coal is about two-thirds discharged, when the car rises and commences to draw back into the shaft. It is therefore necessary to provide a spill gate. The latest design of spill gate has a pantograph extension, which catches all spillage from the cage platform as well as from the car.

This spill gate is operated by a lever on the tipple which is engaged by angle guides on the bale of the cage. The gate is drawn back and nested under the dumping chute by means of its own weight aided by the counterweight.

The cars are retained on the cage by keepers similar to those employed in an ordinary self-dumping cage. Where brakes are not used a shelf engagement is provided over the wheels, in addition to dogs that engage either the wheels or lugs on the car. The latest designs of this cage have keepers of the Lepley type, which go partly around both wheels and hold them secure against the possibility of sliding and overturning. Objection is sometimes made to placing dumping equipment at the bottom of a downcast main shaft on the ground that the dust produced may be carried into the main haulageways. This objection may be overcome by making the hoist compartment of the auxiliary shaft the downcast and the air compartment the upcast, thus placing the main shaft on practically dead air. The opening connecting the dump to the shaft can be entirely sealed off, except for the chutes, which are open only while the skip is loading. It also may be possible or advantageous to provide a separate airshaft, possibly of circular form, in which case the auxiliary hoisting shaft will be downcast and the main shaft, as before, will be on dead air.

Consider Cars in Locating Auxiliary Shaft

It is desirable in arranging the mine bottom for either a skip or cage hoist to locate the auxiliary shaft so that cars may be readily shunted from trips and sent to the secondary hoist without serious interruption to main operations. This auxiliary shaft should also be located with full consideration for getting cars, mining machines, material and men to and from the main workings. The mine motor pits and repair shop, if any, are located where the haulage motors, crippled machines and cars may be readily shunted from the main haulage roads. They should also be convenient to the auxiliary hoisting shaft.

As in cage hoisting, the entries leading to the shaft may be arranged in many different ways. Numerous efforts have been made to adapt the revolving dump and skips to existing cage hoists but as far as I know no entirely satisfactory solution of this problem has as yet been worked out.

What Constituents in Ash Cause It to Fuse

Amount of Volatile Matter in Coal Not Important to Purchaser if He Gets Thermal Value—Silica in Quantity Gives High Fusion Temperature—Iron and Sulphur Lower Fusing Point—Temperature Should Exceed 2,450 Deg. F.

By G. A. de Graaf*
Bloomfield, N. J.

LARGE consumers of bituminous coal have realized for many years that the specifications under which they have been purchasing their fuel need modification and should be so changed as to meet the demands of boiler-operating practice. Most existing specifications are illogical. They fully cover items that are of little value, while other considerations of greater importance are entirely neglected.

Market conditions have recently been such that buying under specification is not possible. The time is not far distant, however, when consumers once more can select the coal they need to suit their particular purpose and equipment and buy it according to specifications.

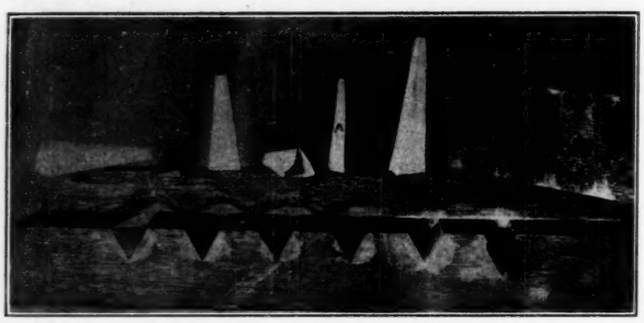
If one examines the specifications ordinarily employed he will find that the following terms usually are mentioned: (a) Moisture, (b) volatile matter, (c) fixed carbon, (d) ash, (e) sulphur, (f) heating value, (g) fusing temperature of ash, (h) clinkering of ash.

The following table gives the proximate analysis (air-dried basis) of fifteen coal samples of which the ash was analyzed and its fusing temperature determined. The coal was of poor quality and not purchased under contract, but in the open market. The contract called for 22 per cent volatile matter, 8.50 per cent ash and 14,200 B.t.u.

TABLE I. ANALYSES OF FIFTEEN AIR-DRIED COAL SAMPLES, WITH THEIR HEAT VALUES

No. of Sample	Moisture at 105° C. per Cent	Volatile Matter, per Cent	Fixed Carbon, per Cent	Ash, per Cent	Sulphur, per Cent	Heat Content, B.t.u.
A*	0.47	20.21	62.62	16.70	3.51	12,887
B*	0.50	20.03	65.35	14.12	3.23	13,217
C*	0.41	19.24	64.11	16.24	1.78	12,439
D*	0.61	19.56	61.67	18.16	3.22	12,262
E*	0.42	18.95	62.76	17.87	3.67	12,421
F†	1.05	27.65	56.72	14.58	0.55	12,439
G†	0.99	28.70	53.93	16.38	0.78	12,260
H†	0.10	29.72	56.99	13.19	0.88	12,774
I	0.56	26.42	58.24	14.78	0.91	12,987
J	0.37	28.90	55.15	15.68	0.85	12,403
K	0.46	35.04	50.84	13.66	1.46	12,756
L	0.29	27.47	60.08	12.16	1.01	13,300
M‡	0.90	25.38	59.71	14.01	1.54	12,554
N‡	0.77	23.15	57.14	18.94	1.21	12,002
O	0.84	15.55	66.51	17.10	1.89	12,264

* Samples A, B, C, D and E were each taken from one of five hatches of a barge.
† Samples F, G and H were each taken from one of the three hatches of a barge.
‡ Samples M and N were taken from the same storage pile.



STANDARD SEGER AND ASH-TEST CONES

The grooved block in the foreground is used for making the paper envelopes in which the ground ash is formed into cones. Three of the envelopes can be seen lying with their mouths pointed toward the reader. One is still on the forming block.

*Chemist, Public Service Electric Co., Newark, N. J.

Almost without exception the purchaser will give great weight to the percentage of volatile matter and sulphur. The volatile matter as given in a proximate analysis, however, can determine only the general nature of the coal. It does not reveal anything about its burning qualities or heat content.

Why Low Sulphur Has Been Specified

It was once generally believed, and many still give credence to the idea, that sulphur in coal is deleterious, for three reasons: (1) Because of the sulphur dioxide formed during the combustion of the coal; (2) because of its relation to clinkering; (3) because of its being the probable cause of spontaneous combustion.

It is said that the sulphur dioxide in the flue gases upon cooling unites with water, forming sulphurous acid, and both the sulphur dioxide and the sulphurous acid, which may have been further oxidized to sulphuric acid, corrode the metallic parts exposed to them. A corrosive action, however, can take place only after sufficient cooling, hence corrosion of boiler tubes, etc., is scarcely possible under operating conditions.

Sulphur occurs in coal largely as iron pyrite (FeS_2), as organic sulphur combined with carbon or with carbon and hydrogen, as free sulphur and as sulphates of iron, alumina and calcium; the sulphates usually are found only in weathered coal. Pyrite and other mineral matter containing sulphur, either free or combined in the form of sulphates, may be scattered throughout the coal either in large lumps or in a finely-divided state. Free sulphur usually is present in extremely small amounts, as is also organic sulphur.*

Completely Burned Pyrite Will Not Fuse

When pyrite is burned with the coal in the fuel-bed, iron oxide is formed, which by itself would not produce clinkers. Besides other mineral constituents, the ash contains silica and silicates. When this iron oxide is exposed to high temperatures in the presence of these substances, easily fusible silicates, or clinkers, may be produced. If the temperature be high, the fusion will be greatly facilitated.

The temperature of the grate and of the fuel-bed near the grate determines whether a certain coal will form troublesome clinker or no clinker at all. The grate and that part of the ash-bed near it consequently should be kept at as low a temperature as possible during operation. Pyrite upon heating gives off nearly half of its sulphur, leaving ferrous sulphide, which fuses at a red heat.

As said before, the coal may contain pyrite in lumps or in small particles. In this case, if the lumps are of appreciable size, they may fuse before they are completely burned and start the formation of clinkers, thus hindering the combustion of the coal. Of course, if,

*The latter statement is hardly true of, at least, some coals.—Editor.

on the other hand, the pyrite and siliceous matter are scattered throughout the fuel in a finely divided state, clinkering may not occur at all. Moreover there is no possibility that organic sulphur will form clinker.

It may be concluded, therefore, that although high-sulphur may increase the possibility of clinker formation, it is not a definite indication that clinkers will be produced, as the action depends upon the form in which the sulphur is present. For the reasons stated above many coals high in sulphur burn without the formation of clinkers.

Other constituents that must be taken into consideration because they are of importance are moisture, ash content and heating value. In the language of analysis, the term moisture usually is applied to that part of the water which is given off by the coal upon subjecting a finely-pulverized sample for one hour to a temperature a little above 212 deg. F. In general, the moisture thus indicated as existing in coal is lower than that actually contained because during the process of grinding, for instance, the sample gives up a portion of the water it contains.

On the other hand, all the water that the coal holds cannot be expelled in this manner. The mineral constituents of the ash retain water that can be removed only by combustion of the coal or upon heating it to a high degree. This latter moisture must be looked upon, however, as forming part of the coal and should not be included with that mentioned in the specifications.

Water taken up by the coal as a result of weather conditions—rain or snow—usually is termed superficial moisture. This superficial moisture can be removed by air drying or by exposing the coal to a moderate temperature, as is done in the laboratory before a sample is analyzed.

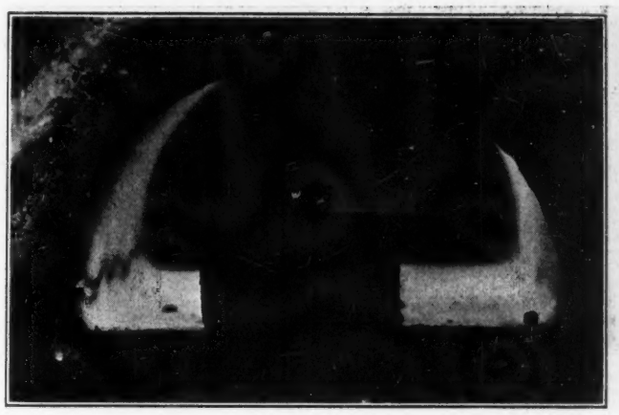
Lump Coal Air Dries Slower Than Slack

Slack coal usually contains more moisture than lump, and the water which it holds, either inherent or superficial, is given off readily. Lump coal, on the contrary, is slow in giving off its moisture and lumps apparently dry may contain a high percentage of water. Hence it is important that the specifications cover this factor and name a fair percentage as a limit, based upon the region where the coal is mined, weather conditions, etc. To pay for water at the same price as for coal is not economical. It takes heat to remove the water which the coal may hold, and this heat could be utilized to raise steam if it were radiated to the boiler.

Ash is that part of the coal that is left after complete combustion of the burnable content; it is inert mineral matter consisting of silica, iron oxide, alumina, calcium sulphate, calcium oxide, magnesia, potassium, and sodium oxides. If its color is red it indicates that it contains much iron and that clinker trouble may be expected; if its color is grayish white it usually will be found to be high in siliceous matter and probably will not form clinkers.

The amount of ash in coal depends entirely upon the inherent nature of the material and upon the preparation administered before shipment. Clean coal may contain as little as 4 or 5 per cent of ash or even less, while dirty coal may have as much as 30 per cent.

As the ash content increases the heating value will decrease, hence the amount of incombustible in the coal must affect the price the purchaser is justified in paying. Usually he will lower the price per ton a certain amount for each per cent of ash found upon analysis in excess of the content permitted by the specifications.



INTERIOR OF OVEN, SHOWING POSITION OF CONE

The cone is placed on its side so that the observer can readily note when it begins to droop over. With the optical pyrometer the intensity of the light developed by the incandescence of the cone is compared with an electric light of measured strength, thus determining the temperature. The cone is put far enough back to receive the unmitigated heat of the oven.

The purchaser must bear in mind that the more refuse in the coal the more fuel must be fired; that the fuel bed naturally becomes heavier and heavier during operation; that this shuts off the draft, retarding combustion of fresh coal. Furthermore, keeping hot a thick layer of ash results in burning of the grates and boiler settings, as well as in the radiation of less heat to the boiler. The fires have to be cleaned oftener, meaning a waste of fuel and extra labor for removing the ash.

The heating value of coal is determined in an apparatus called a calorimeter, designed for that purpose. This heat content is expressed either in calories or in British thermal units. It represents when expressed in the latter nomenclature the number of pounds of water that can be raised one degree Fahrenheit by the combustion of one pound of coal.

The heating value of coal is governed by many factors, although it can be accurately calculated from its ultimate analysis. Ash, moisture, carbon, hydrogen, oxygen, nitrogen and sulphur control it.

Specifications Often Omit Essentials

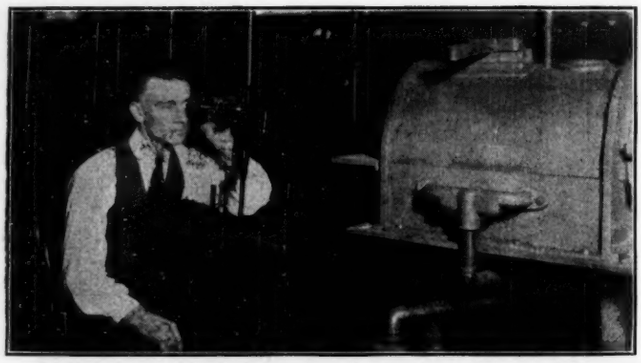
Items hitherto not prominently mentioned in coal specifications but which nevertheless are of great importance are burning qualities, such as caking, non-caking, free-burning, etc.; clinkering properties and fusing temperature of the ash.

TABLE II. ANALYSIS OF THE ASH OF THE FIFTEEN COAL SAMPLES INCLUDED IN TABLE I

Sample No.	Moisture 105° C., per Cent	SiO_2 per Cent	Fe_2O_3 per Cent	Al_2O_3 per Cent	$CaSc_4$ per Cent	Ca O per Cent	Mg O per Cent	K_2O Na_2O per Cent
A*	0.48	49.44	41.64	0.80	4.90	1.42	0.36	0.96
B*	0.80	49.28	44.12	0.28	3.88	1.72	0.24	....
C*	0.84	67.52	26.76	1.72	1.70	2.82	0.36	....
D*	0.64	63.12	31.88	3.08	0.68	3.08	0.12	....
E*	0.44	57.24	37.24	1.88	2.52	0.88	1.00	....
F†	0.44	74.16	18.48	1.36	1.16	0.40	2.20	1.85
G†	0.60	71.00	20.92	3.60	2.18	0.90	0.88	....
H†	0.64	68.24	21.52	5.32	1.77	1.59	0.56	1.36
I	0.48	81.24	13.80	3.08	....	0.96	0.52	....
J	0.60	73.12	19.36	3.04	0.48	0.68	0.48	2.14
K	0.40	70.20	22.96	3.28	0.88	0.96	0.56	0.76
L	0.60	71.84	23.24	2.52	0.48	0.16	0.44	0.75
M‡	1.04	74.68	23.72	2.28	1.77	0.75	0.36	....
N‡	0.44	76.04	17.64	3.68	1.08	0.40	0.36	0.26
O	0.60	79.88	13.64	0.96	1.97	0.55	0.32	2.28

* Samples A, B, C, D and E were each taken from one of five hatches of a barge.
† Samples F, G and H were each taken from one of the three hatches of a barge.
‡ Samples M and N were taken from the same storage pile.

The burning qualities should be studied by men thoroughly familiar with boiler-operating practice. The



PHYSICIST DETERMINING OVEN HEAT

The Wanner optical pyrometer measures temperatures from 840 deg. to 7,000 deg. C. The observations are taken through the open oven door. An asbestos screen protects the observer from radiant heat.

fusibility of the ash is largely controlled by its chemical composition and by the distribution throughout the coal of the mineral matter forming it. From the analysis of the ash of fifteen coals made by myself one will observe that the chemical composition even in the same shipment of coal varies markedly.

The ash analyzed was a thorough mixture of the residue left after combustion of a well-mixed sample of coal. It does not represent the chemical composition of the ash throughout all parts of the fuel bed because of the fact that the mineral constituents may be there scattered either in lumps or in a finely-divided state. From the analysis we may be able to draw some conclusions as to the possible formation of clinkers or fusibility of the ash, but, for reasons just given and because of some other considerations, we cannot deduce from the chemical composition anything definite.

Complexity of Ash Makes Prejudgment Hard

If ash were not such a complex mixture it would not be difficult to draw conclusions. If it were a mixture of only silica, iron and aluminum oxides, for instance, we could make definite statements as to its fusibility and clinkering probabilities. Artificial mixtures could be made and studied while exposed to high temperatures and the results used for purposes of comparison.

It has been established that the fusibility of ash depends upon the ratio of the silica to the iron, aluminum, calcium, etc., present. A mixture of, for instance, 54.55 per cent FeO and 45.55 per cent SiO_2 has, according to Hofman, a fusing temperature of 1,110 deg. C., that is, at that temperature these two compounds combine to form a new one, namely, ferrous silicate.

If these new compounds, or silicates, are once formed, they will re-fuse, or melt, at a much lower temperature. It must be well understood that the formation of these new compounds, chiefly silicates, is in fact clinkering; we may thus have clinkers high in silica and low in other minerals and vice versa.

As a rule ash high in silica contains little iron and will not fuse easily; but if the silica decreases and the iron increases, fusing will take place at a lower temperature. If other bases, like the oxides of calcium, magnesium, sodium or potassium, are present, the fusing temperature, or rather temperature of clinker formation, may drop if the ratio of the silica to the bases is such that easily-fusible compounds will be formed. It must be borne in mind that the ash in the furnace under a boiler is far from being well mixed, hence clinkers of varying composition may be formed at different places in the fuel bed.

What has been tried, namely, to find a relation between the clinkering properties of coal and the chemical composition of the well-mixed ash, cannot be successful. Glancing over the accompanying charts, it may be noticed that it seems to be almost a fixed rule that silica, iron and sulphur control the fusing temperature of the ash; of course, they exert a great influence, as they form the bulk of the residue after combustion. To make a complete analysis of ash takes much time, hence other methods must be employed.

Thus far we have discussed clinkering only from a chemical point of view; we must not forget that there are many other factors which influence it also. The construction of the furnace, the combustion space, drafting, both under and above the fire, grates, the cooling of the grates, etc., as well as methods of firing influence clinkering and fusing of the ash, and all should be considered by the operating engineer. Some coal will form large clinkers that under certain conditions in any given furnace may be broken up readily, while the same fuel in the same furnace under different conditions will clinker only slightly or not at all.

Seger-Cone Method of Testing Fusibility

If a sample of coal is taken and the fusibility of its well-mixed ash determined by exposing it under certain conditions to a gradually increasing, well-controlled temperature in a small muffle or crucible furnace, a fairly reliable answer will be obtained to the questions: (a) Will this particular coal form troublesome clinkers? (b) At what temperature will clinkering take place?

It is not the object of this article to discuss the many methods which in course of time have been developed by different investigators, but to describe the method now generally followed by many of the laboratories. This is known as the Seger-cone method.

A fairly large, representative sample of coal is sent to the laboratory and after the superficial moisture has been driven off, this sample is ground to pass a 20-mesh sieve. It is then reduced by means of a riffler and ground to pass a 60-mesh sieve but to be retained on one of a 100-mesh. Sufficient of this material is burned completely in a fused silica dish or crucible to obtain enough ash for about six determinations. A fine stream of oxygen under low pressure is passed carefully through the ash after the combustion is completed, in order to remove all traces of unburned carbon, as its presence will affect the fusing temperature of the material. When the ash is cool it is mixed with water made into a paste and formed into "cones" of about the same dimensions as the Seger cone.

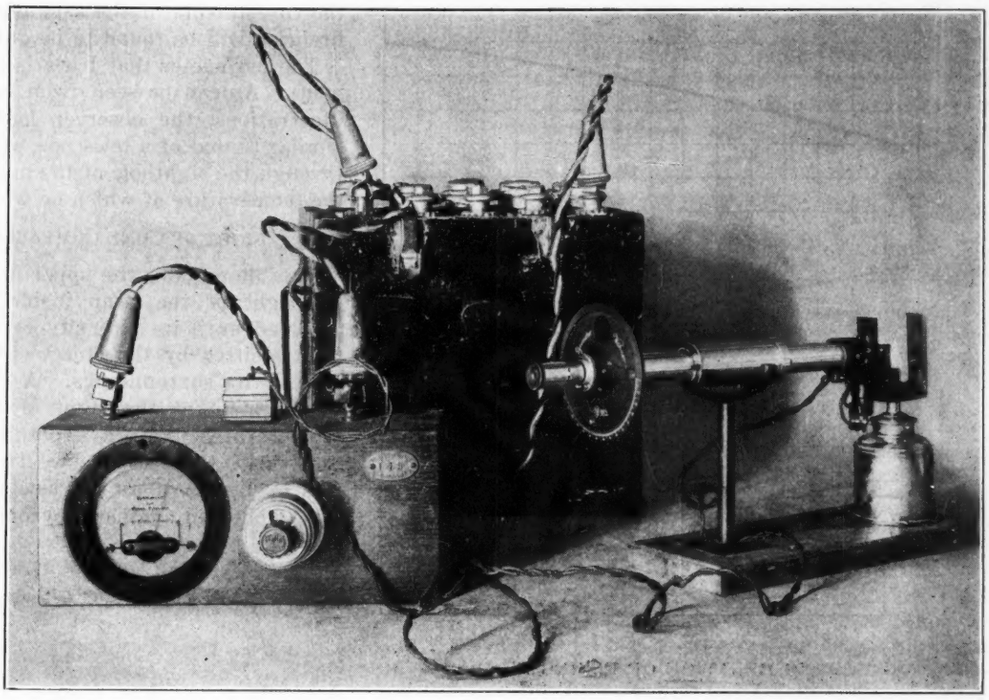
Making Cones for Fusibility Tests

This is accomplished by wrapping around a wooden "Seger-cone" a piece of thin paper, the overlapping edges of which are pasted together with a little dextrin. The paper cone when dry is removed to a block in which the exact forms of Seger cones are cut. The paper cones are kept in place by a movable side of the wooden mold and are filled with the pasty-like ash.

The resulting cones then are dried at a low temperature until the water has evaporated. When dry they are taken out of the form and placed in a horizontal position on a piece of firebrick or fused silica with the end projecting beyond the side of the brick, which is placed in a muffle furnace. The furnace is heated by

Optical Pyrometer

The lamp on the right burns amyl-acetate and is used only for standardizing the electric lamp with which the relative heat intensity of the observed object is compared. With this instrument, as with other optical pyrometers, any workman can take correct readings of temperature, and no deterioration except of the batteries takes place.



large bunsen burners to which the flow of gas and air can be regulated so that the temperature increases at the rate of from 4 to 5 deg. F. per min.

By means of a pyrometer temperature readings can be taken conveniently. An optical pyrometer is well suited to this purpose, as no space inside the muffle is taken up by the couple.

The temperature at which the cone starts to bend down is noted, as is also that at which the apex droops until it assumes a vertical position. The average of these two temperatures is considered to be the fusing temperature of the ash. If also the time elapsing between these two temperature readings is noted some important information is gained concerning the viscosity of the molten ash, and consequently about the kind of clinkers the coal will form.

A number of considerations govern this test. Some of these are: (1) The atmosphere in the muffle; (2) the location of the cone in the muffle; (3) its position, horizontal or vertical; (4) rate of heating; (5) method of supporting the cone.

The atmosphere in the muffle is oxidizing in nature, thus representing the atmosphere in the furnace during the combustion of coal. An excess of air is supposed to be flowing through the furnace so as to insure complete combustion of the fuel. The muffle, which is heated by gas and air under pressure, besides being open in the front is porous and this renders its atmosphere oxidizing. A tube connected to the air compressor leads into the muffle and supplies air, thus assuring an excess of oxygen.

Earlier investigators used a carbon-resistance furnace producing an atmosphere of a reducing nature, because oxygen was taken up in the consumption of the carbon forming the resistance. This is partly burned, producing carbon monoxide and some carbon dioxide. Others have employed an atmosphere both oxidizing and reducing in character. Here the gases were led into the furnace of muffle under pressure. This, however, is expensive and troublesome and probably does not duplicate conditions existing in the furnace under a boiler. The oxidizing atmosphere, everything being considered, is the one that duplicates with fair accuracy the conditions existing in the furnace during operation.

It is of importance where and how the cones are placed in the muffle. This furnace is, to all intents and purposes, equally heated on all sides except the front. Hence the observer should not place the cones too near the front; he must first investigate and ascertain at what distance from the muffle's mouth the temperature is uniform. A piece of firebrick or fused silica is suitable as a support for the cones.

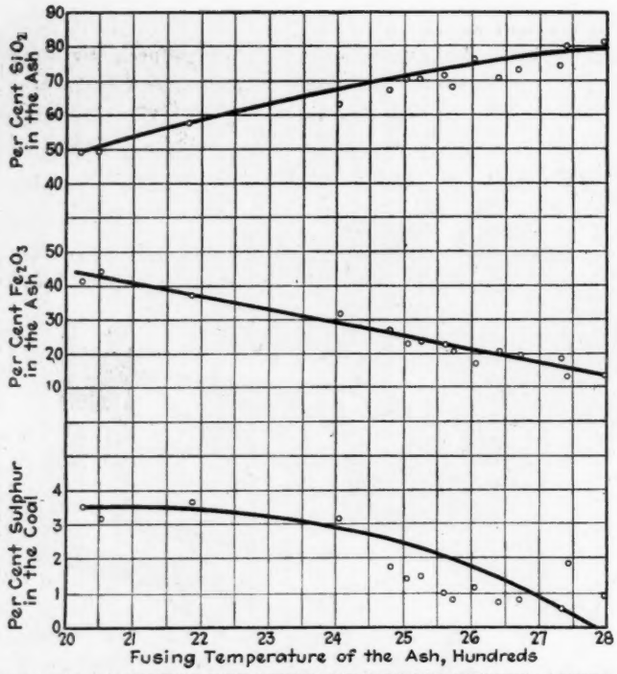
The next question is: In what position should the cone be placed, horizontal or vertical? Opinion on this detail is quite divided, but I believe from experience that the horizontal position is more satisfactory than the vertical, for the following reason: If the cone be placed horizontally, the moment that softening begins the cone will bend by its own weight, and this beyond doubt can be observed by the operator.

When the ash becomes to a certain extent fluid, the apex of the cone will extend directly downward, which is another detail that can be observed at the proper moment—after some experience of course. If the temperature be increased the fluidity of the ash also will increase, and it will be observed that the apex becomes heavier, rounded like a knob, while the cone grows longer and thinner.

Note Beginning and Completion of Fusing

The temperature at which the fusing of the ash takes place must be considered as lying between the beginning and the completion of the bending of the cone. For if we go beyond this latter temperature, there would be no limit—the cone will stretch appreciably and its apex may ultimately reach the bottom of the muffle. Hence two distinct points exist between which we may assume the fusing temperature lies.

If, on the contrary, we place the cone in a vertical position, the softening point cannot so easily be observed—the cone may for other reasons slightly change its position and the observer may take this for the



GRAPHS SHOWING RELATION OF FUSING TEMPERATURE OF ASH TO PERCENTAGE OF SILICA, IRON OXIDE AND SULPHUR

Increasing percentages of silica in the ash render it less fusible, whereas increasing percentage of iron oxide and sulphur make the ash more disposed to fluidity.

beginning of the fusion. Some ashes become quite fluid and the cone may then form a mere ball or a fluid mass from the center of which the apex protrudes and can be seen. Other cones will merely bend and stay bent, the weight and the softening of the cone being insufficient to change its position.

I have placed in the muffle several cones made of the same kind of ash, some in a horizontal and some in a vertical position. No certain determination of a point at which the fusing practically ended could be made by inspection of the vertical cones, while with those that were placed horizontally it was possible to decide beyond doubt the beginning as well as the completion of the fusing process.

The rate of heating has for obvious reasons a decided influence upon the fusion of the ash. The formation of the silicates, which has been previously mentioned, cannot take place instantly; the road must be paved, so to speak. The outer portion of the cone is heated first and reaches quickly the temperature of the muffle, while the inner portion is still at a lower temperature. If, therefore, the temperature increases rapidly, the fusing conditions are not the same for every part of the cone. A glaze may be formed on the outside, which may prevent further softening. Near the fusing temperature a rate of increase of 4 deg. to 5 deg. per min. is found to be satisfactory. If a pyrometer couple is used for measuring the temperature, an increasing lag will be noticed if the rate of heating is increased beyond the measure indicated. Even at the rate just mentioned this type of pyrometer would show some lag. An optical pyrometer overcomes this drawback. It may be added that the rise in temperature at the beginning of the heat should not be too rapid and should not exceed 35 deg. F. per minute up to a point about 350 deg. F. below the melting point of the ash.

The substance used as a support for the cone should be of a material that will not chemically combine with the constituents of the ash. A piece of fused silica or firebrick will be found to be quite satisfactory.

The pyrometer that I use is a Wanner optical instrument. As can be seen from one of the accompanying illustrations, the observer looks through an eyepiece similar to that of a telescope, and directs the instrument through the sighthole of the muffle furnace at the object the temperature of which he wishes to ascertain.

Light of Cone Compared with Standard

This illuminates the upper half of the field of vision; the light of the lamp inside the pyrometer is then adjusted until its intensity is the same as that of the light emitted by the object observed—in this case the cone or its surroundings. A reading is then made on the segment at the right of the instrument and the temperature obtained from a conversion table that comes with the instrument. The pyrometer is standardized by means of an amylacetate lamp and, if desired, can be checked against a pyrometer that is known to be correct.

TABLE III. FUSING TEMPERATURE OF ASH

No.	SiO_2, per Cent of Ash	Fe_2O_3, per Cent of Ash	Al_2O_3, per Cent of Ash	S, per Cent of Coal	Temp. of Fusion, Deg. C., Initial—Final	Temp. of Fusion, Deg. F., Average
A	49.44	41.64	0.80	3.51	1,090–1,125	2,025
B	49.28	44.12	0.28	3.23	1,100–1,140	2,050
C	67.52	26.76	1.72	1.78	1,345–1,375	2,480
D	63.12	31.88	3.08	3.22	1,290–1,345	2,405
E	57.24	37.24	1.88	3.67	1,180–1,215	2,185
F	74.16	18.48	1.36	0.55	1,475–1,525	2,730
G	71.00	20.92	3.60	0.78	1,430–1,470	2,640
H	68.24	21.52	5.32	0.88	1,395–1,425	2,570
I	81.24	13.80	3.08	0.91	1,510–1,560	2,795
J	73.12	19.36	3.04	0.85	1,460–1,505	2,670
K	70.20	22.96	3.28	1.46	1,350–1,395	2,505
L	71.84	23.24	2.52	1.01	1,390–1,420	2,560
M	70.68	23.72	2.28	1.54	1,370–1,400	2,525
N	76.04	17.64	3.68	1.21	1,405–1,455	2,605
O	79.88	13.64	0.96	1.89	1,490–1,520	2,740

(The percentages of three important constituents are given as of the whole ash. Consequently they do not even approximately total to 100. The sulphur percentage is that determined for the original coal.)

From the first of the accompanying curves showing the relation between the content of silica dioxide (SiO_2) in the ash and the fusing temperature it will be noticed that if the percentage of silica increases, the ash tends to have an increased fusing temperature.

The second curve shows the relation between the iron-oxide content (Fe_2O_3) in ash and its fusing temperature. From this it will be noticed that when the percentage of iron oxide increases, the fusing temperature decreases. This also has been observed by Palmenberg.

The third curve shows the relation between the sulphur content in the coal and the fusing temperature of the ash. It will be noticed that when the sulphur in the coal increases, the fusing temperature decreases. This also has been observed by Palmenberg.

Unfortunately, I did not preserve the cones from my tests; in that case I could have presented photographs showing the different shapes that they assumed and also their exterior appearance. Some cones were quite smooth and when exposed to a higher temperature became a molten mass.

Ash Which Adheres to Grates and Brickwork

Ash of this nature clinkers badly. In such a case the partly-burned coal is fused together in big lumps or if the temperature increases the whole may form a sticky mass that runs through the grates or attaches itself to the grate bars, the brick furnace lining, etc., where it freezes upon cooling.

Coal represented by the ash analyses here presented

gave considerable trouble in the furnace. The large amount of ash contained, its low fusing temperature and the low percentage of silica in some instances were the causes of easily-fusible clinkers being formed. These stuck tenaciously to the grates and the brickwork.

It is difficult to say what is the critical temperature of an ash so far as fusion and clinker formation is concerned. This depends largely upon operating conditions, but it seems that 2,450 deg. F. is a good average fusing heat. If ash fuses below this temperature, as has been observed by others as well as myself, the coal will clinker badly.

Simple Operation of Tidewater Coal Exchange Cuts Transportation Expense

Procedure Is Advantageous to Shipper, Transportation Company and Transshipper—Savings Effected Through Elimination of Detention of Cars at Piers—In Fifteen Months No Demurrage Charges Accrued

BY DR. HENRY M. PAYNE*

THE mechanism of pooling as it is done today under voluntary exchanges, although extremely simple, seems not to be well understood by many. All mines so located as to make tidewater shipments, and whose operators have requested classification, are officially listed by the exchange together with the pools into which they are entitled to ship. Such coal, when billed out at the mine, shows upon the way bill the pool to which it is consigned and for whose account. Upon reaching the scales this billing is checked by the scale clerk against his classified list, in order that no coal may be erroneously passed into tidewater terminals, consigned to improper pools.

All coal is billed to the Tidewater Coal Exchange, Inc., for the account of the consignee-member. Simultaneously with its way billing a notice of car number and pool to which shipped is sent to the consignee-member, who thereupon furnishes the Tidewater Coal Exchange, Inc., with advice of such shipment. This, in current idiom, establishes the amount of coal "rolling" to the piers, and forms a basis for the extension of credit to transshipping members, as well as regulating the issue of temporary embargoes against any pool or pools at any pier or piers, should considerable quantities of any particular grade of coal in excess of scheduled loading capacity appear to be en route.

PROGRESS OF A CAR OF COAL ON THE PIERS

Upon arrival at the pier, each car is given a final inspection by the official inspector of the exchange, who checks the billing of same against the official classification, and finding it to be correct and the coal properly prepared, chalk marks the pool number on the side of the car. The shifting engine thereupon makes up the various cars into trains by pools on various tracks in the yard, so that a boat being placed for loading from any particular pool, sufficient cars to make up the cargo are drilled out and run over the dumping apparatus, regardless of the mine from which they were shipped, since, as has been explained above, the purpose of classification is to bring all coals within certain limits and tolerances into individual pools.

The advantages of this proposition to shipper, transportation company and transshipper are obvious. Should the transshipper be delayed in placing his vessel for loading, the railroad is not compelled to hold the cars for dumping should some member with sufficient credit have a vessel waiting to load coal from the same pool. On the other hand, should the member have a vessel placed, and for any reason part of his cargo be delayed en route, his bond being duly filed to cover the credit extended, the commissioner of the exchange may extend to him to complete the cargo, sufficient credit from coal already standing and covered by the member's coal already "rolling."

ELIMINATES TIME AND DEMURRAGE LOSS

As an illustration of the great saving effected through decreased detention of cars at piers the following table was prepared by the original Tidewater Coal Exchange for the port of Hampton Roads, and covers the eighteen months' period from Aug. 1, 1917, to Jan. 31, 1919:

Tonnage dumped	48,785,000
Cars dumped	967,800
Car days saved on gross detention basis	1,747,600
Saving on per diem basis	1,048,560
Number of cars saved	47,035

This represents an average of 2,613 cars, approximating 130,650 tons per month, more coal handled to tidewater at this port by virtue of the exchange than could have been handled without it. It also is worthy of note that from Aug. 1, 1917, to Nov. 30, 1918, not one cent of demurrage accrued at any port, notwithstanding the fact that at that time only three days' free time was allowed.

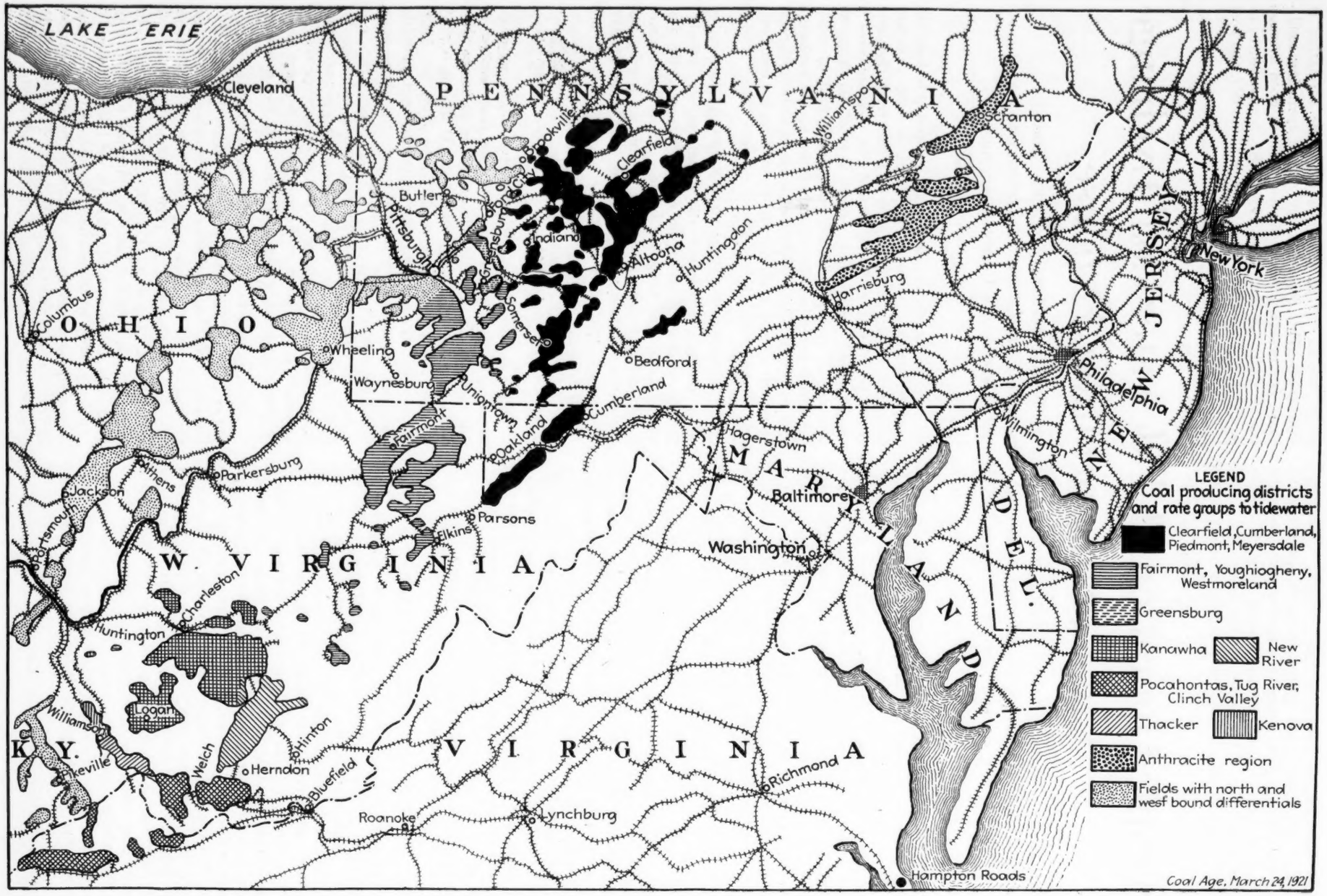
Average demurrage is computed during each calendar month, so that credits from prompt dumpings may apply against unavoidable delays. The total average cost of operation is pro rated each month on a tonnage basis between the participating railroads and the members.

ESTIMATING ECONOMY OF POOLING SHIPMENTS

The present Tidewater Coal Exchange, Inc., has 195 members, and the exchanges at Hampton Roads and Charleston, S. C., have approximately 170 members. During seven months of 1920 for which figures are available the Tidewater Coal Exchange, Inc., at New York, Philadelphia and Baltimore dumped 8,809,979 tons at a total expense of $133,211.18, or 1.5c. per ton.

Another way of estimating the economy of pooling shipments is given in the following calculation based on the record of car saving effected at Hampton Roads, cited above. These figures do not include savings made

*Consulting engineer, Andrade-Eyre, Inc., 300 Madison Ave., New York City.


LAKE ERIE
Cleveland
PENNSYLVANIA
Scranton
Williamsport
Brookville
Clearfield
Butler
Pittsburgh
Indiana
Altoona
Huntingdon
Harrisburg
New York
NEW JERSEY
Philadelphia
Wilmington
Columbus
OHIO
Wheeling
Somerset
Bedford
Waynesburg
Uniontown
Fairmont
Oakland
Cumberland
Hagerstown
MARYLAND
DEL.
Baltimore
Washington
Athens
Parkersburg
Jackson
Portsmouth
Parsons
Elkins
W. VIRGINIA
Charleston
Huntington
Logan
Williamson
KY.
Welch
Hinton
Herndon
Bluefield
Roanoke
Lynchburg
VIRGINIA
Richmond
Hampton Roads
LEGEND
Coal producing districts and rate groups to tidewater
Clearfield, Cumberland, Piedmont, Meyersdale
Fairmont, Youghiogheny, Westmoreland
Greensburg
Kanawha
New River
Pocahontas, Tug River, Clinch Valley
Thacker
Kenova
Anthracite region
Fields with north and west bound differentials
Coal Age, March 24, 1921

in switching and terminal charges, large items of ordinary cost in this business.

Cost of 47 035 cars at $2 900 each	$136 401 500
Interest on investment at 6 per cent	8 184 090
Credits extended to members (excluding Government members) tons	3,000,000
Cost of operation	$470,844
Cost of operation, per ton	0.0099

Economies in the use of vessel tonnage by reason of prompt dispatch as well as the saving of a considerable sum in vessel demurrage is indicated by the number of tons (credits of 3,000,000 tons) it was necessary to extend to members to load their vessels.

Through the kindness of S. T. Snead, commissioner of the Sewalls Point Coal Exchange, Inc., I am able to reproduce (without disclosing the positions of individual shippers) a daily report of the Sewalls Point Exchange. This report shows the service extended to each member.

STATEMENT OF CREDITS AND VESSEL ASSIGNMENTS

At 12:01 A.M., Feb. 5, 1921

Consignee (Coded)	Pool	1	2	Consignee	Pool	1	2
A	2	2,250	....	AB	1	3 250	2 100
	3	550	....	AC	1	1,500	....
	8	1,350	....		2	3,900	....
B	1	100x	....		4	100	....
	2	10 100	....	AD	1	8,950	....
	4	100	....	AE	1	750	....
C	1	3,300	....	AF	1	6,800	....
	2	2 300	....		2	6,400	....
D	1	8,000	2 500		4	200	....
E	1	50x	....	BC	1	13 450	....
F	2	50	....		2	4,200	....
	4	500	....		4	50	....
G	1	700	....	BD	1	5 650	....
	2	8 250	....		2	9,850	....
	4	350	....		4	6,650	2,250
H	1	950x	....	BE	1	1.850	....
	2	6,050	....		2	2 850	....
	4	50	....		4	150x	....
	8	3,600	....		7	100	....
AA	2	2.400	....	BF	1	600	....
	4	4,350	2,500		2	6,050	....
BB	2	6 200	....		4	3.600	....
CC	1	200x	....	K	1	9,050	....
	2	750	....		4	50	....
	4	100	....	L	1	50x	....
	8	4 800	....		2	50x	....
DD	1	50	....	M	1	2 200	....
	2	800	....		3	5,700	....
EE	1	11,700	....	N	1	1,100	150
	2	3,650	....		2	6 650	....
	4	9,300	....	X	1	600	....
FF	1	7,550	....		2	50x	....
	2	50x	....				
	8	2 950	....				

1—Credits based on Form No. 1 reports received to 3 p.m. previous date.
2—Tonnage of vessels waiting and loading (gross).
x—Overdrawn based on Form No. 1 reports received and admitted to record.

COAL AND VESSEL SITUATION 12:01 A. M., FEB. 5, 1921

COAL

Pool	Tons at Port	Due 24 Hours	Due 48 Hours	Due After 48 Hours	Total
1	18,950	8,750	21.000	38,700	87.400
2	38,000	5 100	8,800	9,450	61,350
3	400	350	1.000	1,900	3,650
4	20,200	900	900	10,650	32,650
7	300	0	0	0	300
8	9,200	50	650	400	10,300
	87,050	15,150	32 350	61,100	195,650

VESSELS

No. Vessels	Pool No.	Cargo	Bunker	Total
3	1	4,600	150	4,750
0	2	0	0	0
2	4	4,750	0	4,750
0	8	0	0	0
Totals		9,350	150	9,500

LOADING AND DUMPING

		To-Day	To Date	Last Mo.
No. cars loaded at mines (Feb. 4, 1921)		338	.....	.....
No. empties at mines for today's loading		621	.....	.....
No. cars received past 24 hours		365	.....	.....
No. cars dumped past 24 hours		141	.....	.....
No. cars reconsigned		10	.....	.....
TOTAL CARS released		151	.....	.....
Cars on hand		2,089	.....	.....
Cars in transit		2,298	.....	.....
Total		4,387	.....	.....
Tons dumped last 24 hours—2—8-hr. shifts—	Foreign cargo	3,972	15 649	29 346
	Foreign bunker	522	6,355	4,425
	New England cargo	1,277	17,610	20,029
	New Eng. bunker	0	989	306
	Other coastwise	406	904	259
	Panama	2,323	10,099	3,810
	Navy	0	5,000	394
Total		8,500	56,606	58,569
Tons dumped to date last year		.....	37,015	.....

The accompanying map shows the various freight rate districts in the coal fields tributary to tidewater. Six rate groups are indicated on the map by patterns covering the producing coal fields. The port of New York carries a flat rate for transshipment, which varies according to the location of the pier, the "lower ports" being South Amboy, Port Reading, Elizabethport and Arlington (St. George). The "upper ports" are Pier 18, Port Liberty, Harsimus Cove and Undercliffe. The rates now in effect (without war tax) are as follows:

District	New York Lower Pts.	New York Upper Pts.	Philadelphia Outside	Philadelphia Inside	Baltimore Outside	Baltimore Inside	Hampton Rds. Outside	Hampton Rds. Inside
Clearfield, Cumberland, Piedmont, Meyersdale	$3.11	$3.16	$2.60	$2.93	$2.53	$2.93	.....	.....
Greensburg	3.21	3.26	2.70	3.03	2.63	3.03	.....	.....
Fairmont, Youghiogheny, Westmoreland, Pocahontas	3.36	3.41	2.85	3.18	2.78	3.18	.....	.....
Tug River	....	....	....	....	....	....	2.80	3.04
Clinch Valley, Thacker, Kanawha	....	....	....	....	....	....	2.90	3.14
Kenova	....	....	....	....	....	....	3.00	3.24

Many Employees Bought Stock Outright

FINAL figures of subscriptions to the company stock offered by the Lehigh Coal & Navigation Co. indicate that this campaign, the first of the sort in the anthracite industry, has been a success. Eight hundred and seven employees have subscribed for shares, under the limitation that five shares should be the maximum for any one person. This number includes the employees of the two subsidiary companies—the Alliance Coal Mining Co. and the Cranberry Creek Coal Co.

The plan, in brief, was that shares would be sold at 65, that they could be paid for on the installment plan with not less than $5 per month paid on each share, and that a special cash payment of $2 per share per year would be paid for five years, making the net cost per share to employees $55.

Although the installment provisions were so liberal, 53 employees, taking a total of 239 shares, preferred to pay in full, and a good proportion of the remainder chose to pay down considerably more than the minimum installment. Some of the latter intend to pay off the full amount within a short time instead of allowing their payments to run over the maximum period. Stock certificates are being forwarded daily to the employees who have completed payments on their subscriptions.

It is interesting to note that 33 per cent of the subscriptions were for the full amount of five shares, while of the subscriptions from the employees of the Lehigh Coal & Navigation Co. only 43 per cent were for five shares. The experiment has aroused interest among mining companies, particularly since the results became known.

THE DECREE OF THE U. S. Supreme Court of Feb. 4 last, reversing the decision of the U. S. District Court for the Southern District of New York rendered in 1915 regarding the suit brought in New York by the government against the Lehigh Valley Railroad Co. and a number of coal companies and individuals, charging combination in restraint of interstate trade and commerce, was filed in the U. S. District Court of New York on Feb. 25. The case was tried in November, 1914, and was determined in favor of the defendant, the decree being entered in February of the following year. The government appealed the case to the Supreme Court, which reversed the lower court, instructing that the decree be filed in the New York District Court.

MATTHEW VAN SICKLEN has been appointed assistant chief mining engineer of the Bureau of mines to succeed C. L. Colburn, who has been made safety engineer in charge of the co-operative work between the Bureau of Mines and the National Safety Council. Mr. Van Sicklen was graduated from the Columbia School of Mines in 1906. He has had an extended mining engineering experience in this country and in South America.

Problems of Operating Men

Edited by James T. Beard

Planning the Mine for the Use of Improved Equipment

The Rapid Development of Improved Mining Equipment Calls for the Careful Study of Underground Conditions with a View to Planning the Mine in Such a Manner as to Utilize New Equipment to Greatest Advantage

MINING men having a broad vision looking to the future will have read with interest the excellent letter of N. D. Levin, *Coal Age*, Jan. 6, p. 21, relating to the use of improved cutting and loading machines in mines, especially in the working of low coal.

For some time past, I have been anxious to obtain information from men of practical experience in mining who have given much thought and attention to the use of this style of equipment. Many regard such machines as wholly in the experimental stage and are unwilling even to give them a fair trial.

One of the reasons why the introduction of any new style of mine equipment is handicapped is the strong prejudice, so natural among mining men, causing them to continue the use of machines and methods with which they are acquainted. To such an extent is this true that old familiar practices in coal mining generally die a hard death. It explains largely the reluctance of the rank and file of mining men to make changes in equipment already installed and methods in use.

To overcome this degenerate tendency there is needed, first the enlightenment of mine officials in regard to the advantages to be gained by the use of the new equipment, even though it may be necessary to plan future development to conform to the requirements of the new machines. Then, after this has been accomplished there will yet remain the education and training of the men, who are prone to regard any new equipment with suspicion and disfavor.

Conditions Ideal for Use of Coal-Loaders

In this particular field where I am located many of the conditions are most ideal for machine cutting and loading, more so than in any district I have ever visited. However, owing to a machine having been installed here some time ago, that did not give satisfaction, it will take time to overcome the prejudice that prevails, and convince many of our operators that the improved machines can be worked to advantage, and will reduce the cost per ton for mining and loading the coal.

The machine to which I refer was a cutter and loader that was claimed to eliminate the need of blasting the coal. I visited the mine where the machine was at work, and my observation was that the difficulty arose from their inability to supply the mine cars as fast as the machine could load them. The result was that there was a great loss of time because of the frequent stopping and starting again of the machine.

It is quite natural for an operator to emphasize all the points in a new machine that are a hindrance in its use. Say there are three men required, as Mr. Levin states, to operate the machine in question—one man to run the machine, one to handle the scraper and a third to attend to the movement of the cars that are being loaded. If these three men must stand idle because there are no cars to load, the cost-sheet will at once show a high cost of operation; but that is not the fault of the machine.

What the Machine Will Do

Let us consider, for a moment, the figures given by Mr. Levin, who says the machine will load from 70 to 75 tons of coal in eight hours. He refers in his article to the working of a 35-in. seam in which the rooms were driven 24 ft. wide. Assuming the coal is cut 5 feet deep, there would be practically 13 tons of coal to be loaded from a single place, and this would require moving the machines at least six times in an 8-hr. shift.

This suggests the thought that much time is lost in moving the machine when working under such conditions. It may be as much as a third of the time will be lost in moving. It is clear if the plant could be arranged so that this time could be put to useful work, the cost-sheet would show a vast difference in favor of the machine.

Just here, let us see what this machine will do when cutting and loading the coal in a seam I have in mind, which is 5 ft. 8 in. high and where the rooms are driven 40 ft. wide. The cutter-bar of the coal cutter is 6 ft. 6 in. long. A single cut across the face of the room, in this seam, will bring down, say 54 tons of coal.

In the instance first considered, it required six moves of the machine to mine and load 75 tons. In the second instance mentioned, with two moves of the machine it would be possible to mine and load $2 \times 54 = 108$ tons. I refer to this merely by way of comparing the work of the machine under different conditions.

Working Out a Plan

Allow me, here, to suggest a plan of using to great advantage such cutting and loading machines in a seam where the roof will permit the rooms to be driven 40 ft. wide. I have in mind a district where rooms of this width are driven 300 ft. in depth, with 25-ft. pillars between them.

My plan would be to drive these rooms in sets of three, laying the track in the center of each room, so as to reduce the distance the scraper must pull the coal to the machine. A shortwall machine having a cutter-bar 6½ ft. long could cut six of these rooms in a single shift and keep well out of the way of the loading machine.

In a 4- or 5-ft. seam where a 6½-ft. cut would yield, say 35 or 40 tons, three loaders would load all the coal a single shortwall machine would cut, each loader loading the coal from two rooms. That would mean the cutting and loading of $3 \times 75 = 225$ tons of coal in an 8-hr. shift, as being possible in this field.

In order to expedite the work of moving the machine from place to place, I would arrange to move the switches up as each new crosscut is driven in the pillars between the rooms. Some time will necessarily be lost in switching the cars loaded by the machine and placing the empties, unless double tracks are laid.

Another Plan

Another plan would be to lay the track along the straight rib and extend it along the face of the room, slipping it forward as the face is advanced. This would enable more cars to be placed at one time, for loading, and would not require as frequent visits of the gathering motor. However, the arrangement should be such that as little as possible time would be lost. In any case, it should not require more than two or three minutes, at the most, to change cars.

For an output of 2,000 tons a day in a 5-ft. seam, I estimate that from 12 to 15 shortwall coal cutters would be required. Two of these would prob-

ably be employed in driving narrow-work. Mining and loading 50 tons of coal, in a single room, would require two loading machines for every three rooms.

There would then be $3(40 + 25) = 195$ ft. of entry required to keep ahead of the loaders, besides $3 \times 25 = 75$ ft. of crosscut, making 270 ft. of narrow-work to provide sufficient territory for two loaders.

The entire equipment, on this basis, would be 27 loaders and 10 or 12 cutters, working on rooms and narrow-work. One man operating an electric drill can do the drilling and shooting for each cutting machine, while two men will lift bottom and keep the timbering up to the face.

Where the haul is not excessive four gathering motors will be able to handle this output, in cars having a capacity from 2 to 2½ tons. Indeed, in this field, there would be no difficulty in handling 4-ton cars. This is an interesting subject and worthy of careful discussion, which I hope will be continued.

Hillside, Ky. OSTEL BULLOCK.

ANOTHER LETTER

Experience in the past reveals the fact that it has always been necessary to make whatever changes are required in a mine to adapt it to the use of improved equipment.

REFERRING to the interesting letter of C. R. Stahl, *Coal Age*, Feb. 17, p. 319, permit me to say that I am glad Mr. Stahl has written on this subject. He expresses clearly the opinion of the average mining man; and his comments furnish the best possible proof of the statements made in my previous article on loading coal by machinery.

Mr. Stahl, like most mining men, objects to making any changes in the mine, to suit modern machinery; but takes the stand that improved machinery must be made to suit the mine. That principle has not worked out in the past and it never will in the future. Our ancestors carried coal out of the mines in baskets; but in course of time, cars were used to haul the coal.

CARS REPLACE BASKETS

Had Mr. Stahl's idea been carried out at that time, there would have been no rails laid, but the cars would have been built to run on the floor without rails, as that was the condition when the coal was carried out in baskets.

The theory of adapting the improvement to the mine was no more practical then than now; and the conditions in the mine were changed to make it practicable to use cars for conveying the coal. In other words, suitable entries were driven and tracks laid.

From time to time since then, conditions in the mines have been changed, in order to permit the use of more modern equipment; trolley wire has been hung in the mines and plans made to haul the coal by locomotives in place of mules. It was recognized that changes were necessary in order to adapt the mines to the use of electric haulage.

Again, it was found to be necessary to change conditions in the mines in order to use coal-cutting machines; it was, and always has been necessary to change conditions in our mines whenever new machinery has been adopted, and conditions must now be changed to enable the use of loading machines.

In order to adapt a mine, however, for the use of the 38-A loading machine, but little alteration has to be made. Conditions can remain about the same as in an average room-and-pillar mine, except that suitable side tracks should be laid for standing cars close to the machine so as to reduce to a minimum the time required for shifting the cars as they are loaded.

Mr. Stahl probably does not realize the difference between a man and a machine. The man who loads coal gets tired, but a machine does not. If a man has to wait 10 or 15 min., or even half an hour, for a car his time is not wasted, because he can rest and there are other things he can be doing in the meantime. With a machine, however, it is different. To gain the largest success a machine must be run as nearly continuously as possible; any delay is that much waste.

The suggestion that a machine must demonstrate its superiority under average working conditions before it can form a part of the regular equipment of a mine in continuous operation is absurdly impossible. How can a machine show its value, may I ask, if it has to take its turn with the hand loaders in receiving cars? It cannot load more coal than the supply of cars afforded, any more than a person can swim if he is not to go near the water (as suggested in the little verse quoted by Mr. Stahl).

Allow me to say again, I am glad that this letter has appeared, and hope that the discussion will be continued in the columns of *Coal Age* till the practical utility of coal-loading machines in mines is demonstrated. It would be interesting and undoubtedly result in much benefit to the coal industry if practical men from various parts of the country will offer their suggestions as to how conditions in mines can be improved.

Columbus, Ohio. N. D. LEVIN.

Mine-Locomotive Haulage

Reducing the cost in mine haulage, by employing heavier locomotives and hauling longer trips, thereby requiring fewer passing tracks, which means less time lost by trips having to wait for each other.

KINDLY permit me to refer to the inquiry on mine haulage, *Coal Age*, Feb. 17, p. 321, asking for the number of 10-ton locomotives that will be required to handle a daily output of 2,000 tons in eight hours, up a one per cent grade, over a track three miles between terminals, the weight of rails being 50 lb. per yd. and the capacity of the cars two tons each.

The reply to this inquiry estimates that a 10-ton locomotive will haul eight loaded trips of twenty-five 2-ton cars each, up this grade, making 50 tons of coal hauled per trip per hour; and requiring $2{,}000 \div (8 \times 50) = 5$ locomotives to handle this output.

Incidentally, allow me to draw attention to an evident omission in the sketch or figure giving the plan of haulage, which shows but two passing tracks between the terminals. In the arrangement shown in that figure, it is clear there should be two more partings, as I have indicated by the dotted lines in Fig. 1. Otherwise, it would be im-

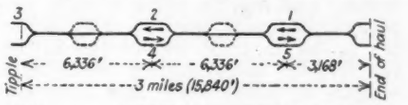


FIG. 1. ORIGINAL ARRANGEMENT

possible for Trip No. 2 to pass Trip No. 3, or for Trip No. 1 to pass Trip No. 4, on the single track shown in the original figure.

In reference to the proposition presented in this inquiry, allow me to suggest the advisability of using heavier locomotives than those designated by the inquirer. By so doing, it is possible to haul more cars and employ but four locomotives instead of five, as estimated in the reply. It is true that this will require a somewhat greater length of parting in each case and possibly heavier rails.

However, as indicated in Fig. 2, there will then be required but three passing

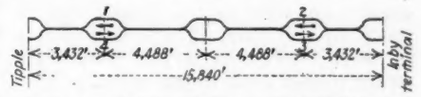


FIG. 2. PROPOSED ARRANGEMENT

tracks instead of four, and less time will be lost in trips waiting for each other. The cost of operation will be further reduced by the expense for upkeep of four locomotives instead of five and the elimination of one crew.

In the arrangement I propose using four locomotives; the distance between each terminal and the nearest parting should be enough less than the distance between the partings, in order to allow time for switching at the terminals. Assuming a speed of hauling of six miles per hour, or 528 ft. per minute, and allowing four minutes at each terminal for switching, makes the distance between the partings 4,488 ft., and the distance between each terminal and the nearest parting 3,432 ft.

In Fig. 2, I have shown Trip No. 1 passing Trip No. 4 at the first parting from the tipple and Trip No. 2 passing Trip No. 3 at the first parting from the inside terminal. While Trip No. 1 goes to the tipple, switches and comes back to the same parting, and Trip No. 3 goes to the inside terminal, switches and comes back to its same parting, Trips Nos. 2 and 4 exchange places, passing at the central parting.

EDWARD H. COXE,
Gen. Mgr. Snowden Coke Co.
Braznell, Pa.

Defective Rail Return in Power Transmission

Look well to the bonding of the rail return where there is difficulty in the transmission of the power required at the face. A good feeder is useless with a defective rail return.

IN THE issue of *Coal Age*, Jan. 13, p. 72, a mine foreman from Chambersville, Pa. told of his troubles in getting sufficient power in the mine. In the reply to this inquiry it is stated that the trouble probably lies with the engines driving the generators.

Without further investigation of the matter and judging from general experience, I would say the chances are ten to one that the trouble lies in the rail-return. Investigations made in a number of mines show that a 30 per cent loss of all power is quite common; and, furthermore, that this loss is due mostly to poor bonding.

It is rather common to see a good sized positive feeder running a long distance into a mine, only to find a very poor return. For instance, a 500,000 circ.-mil. feeder may be used, and the return will consist of only 20-lb. rail, which is equal to 200,000 circ.mil. with a 2-0 bond poorly attached to one rail only.

It is not sufficient to get the power to the working face in a mine; but the current must also be conducted back to the power station. For this return, a good electrical conductor is just as essential as the positive feeder.

In fact, good practice requires a greater capacity in the return than in the positive feeder. The excessive loss in these conductors is just that much power robbed from useful work.

I would advise this mine foreman to look after the bonding of his rails, and then not follow a too frequent custom of keeping new and good bonding near the face and entirely neglecting the old and wornout bonding nearer the power station.

JOHN G. KJELLGREN.

Cleveland, Ohio.

ANOTHER LETTER

An instance cited where a poor system of rail-bonding disabled a 13-ton locomotive operating at 3,000 ft. from the power station.

MY attention was arrested by the inquiry in *Coal Age*, Jan. 13, p. 72, describing an electrical installation that failed to give satisfactory service. I agree with the statement made in the reply to this inquirer that his meaning is that the circuit-breaker was set to limit the current to 400 amp.

As has been stated, the two generators of 150-hp. each are doubtless working in parallel and developing a total of 300 hp. Operating on a 250-volt circuit, this would mean a circuit of $(300 \times 746) \div 250 = 895$ amp.

On the other hand, if operating on a 500-volt circuit, the current would be one-half of this amount or, say 450 amp. In the first instance, it would mean that the circuit-breaker is set at one-half of the proper allowance. In the second case, however, it is set about right.

It occurs to me that the actual trouble, in this case, is more apt to be due to poor rail-bonding, which would mean a large loss of power and would fully explain the trouble feared to be at the power station. It reminds me of a similar instance, in my own experience, where the trouble was found to arise from the poor bonding of the rails.

In that case, a 500-kilo-volt-ampere rotary converter was operating on a 250-volt circuit and transmitting power 3,000 ft., where a 13-ton locomotive was unable to haul twenty-five cars up a two per cent grade. An electrician located the trouble in the bonding of the rails and the old bonds were replaced with new ones, the result being that the locomotive then hauled forty cars up the grade with ease.

In the present instance, it is possible that insufficient feeder-lines or insufficient feeder-taps to the trolley wire may be the cause of the loss of power in transmission. It is certain, however, that the generators are not overloaded, as thought possible by the mine foreman.

SAK.

————, Pa.

Inquiries Of General Interest

Power Required to Drive Fan

The Ventilating Equipment at a Mine Must Be Adequate in Two Respects: First, the Dimensions of the Fan Must Be Such That It Will Be Capable of Delivering the Required Air Volume at a Speed That Will Permit of Being Increased in Case of Need. Second, the Engine Driving the Fan Must Be Able to Develop the Power Necessary to Operate the Fan at the Increased Speed

IN THE ventilation of our mines, we are up against a proposition that we do not understand sufficiently to know exactly what is wanted. The development underground has progressed to a point that something must be done to improve the ventilation at the working face.

Having cleaned up the airways and done everything that is possible underground to increase the circulation of air, the problem appears to resolve itself into improving the ventilating equipment.

A study of the situation shows that the engine is not large enough to drive the fan much faster than it is running at the present time. Aside from this, however, we are not at all sure that the fan would give the required volume of air if operated at a greater speed.

Another thing I want to ask is: In what proportion must the power be increased to increase the speed in a given ratio? For example, if 65 hp. will drive the fan at a speed of 70 r.p.m., what power will be required to increase this speed to 90 r.p.m.? Also, what relation does the speed of the fan bear to the volume of air it will deliver under the same conditions in the mine?

Staunton, Ill. MINING ENGINEER.
Mt. Olive & Staunton Coal Co.

Assuming, as this correspondent has stated, that everything has been done to decrease the frictional resistance in the mine, which would increase its potential factor and make it possible to circulate a maximum air volume, with a minimum power consumption, the first question to determine is the mine potential, as expressed by the ratio of the volume of air in circulation (cu.ft. per min.) to the square root of the unit pressure (lb. per sq.ft.).

For example, suppose the present circulation in the mine is, say 165,000 cu.-ft. of air per minute, under a water gage of 1.5 in., corresponding to a unit pressure of $1.5 \times 5.2 = 7.8$ lb. per sq. ft. We will say this circulation is produced by a fan running at a speed of 70 r.p.m., and the engine driving the fan is developing 65 i.hp.

The power on the air is $Qp \div 33{,}000$; or $(165{,}000 \times 7.8) \div 33{,}000 = 39$ hp.; and the efficiency of the ventilating system is $(39 \times 100) \div 65 = 60$ per cent.

Now, let it be required to ascertain what air volume will result by increasing the speed of the fan from 70 to 90 r.p.m. In fan practice, the fourth power of the speed of the fan varies, practically, as the fifth power of the quantity of air in circulation. In other words, the quantity ratio is equal to the fifth root of the fourth power of the speed ratio. Hence, calling the required quantity Q, we have

$$Q = 165{,}000 \sqrt[5]{\left(\frac{90}{70}\right)^4} = 165{,}000 \sqrt[5]{\left(\frac{9}{7}\right)^4}$$

$$= 201{,}700 \textit{ cu. ft. per min.}$$

But, since the pressure varies as the square of the quantity and the power as the cube of the quantity, the water gage will increase from 1.5 to 2.24 in. and the power required to drive the fan will increase from 65 to 118.8 hp.

Before we can determine the size of

fan required for this increased circulation (201,700 cu.ft. per min.), it is necessary to calculate the mine potential (X), as expressed by the ratio of the original air volume (165,000 cu.ft. per min.) to the square root of the unit pressure (7.8 lb. per sq.ft.); thus,

$$X = 165{,}000 \div \sqrt{7.8} = 59{,}080.$$

From this value of the mine potential (X) and the increased air volume (Q) and speed (n) of the fan, the outer diameter (D) of the fan is calculated by the formula:

$$D = 467\,\frac{Q}{nX} = \frac{467 \times 201{,}700}{90 \times 59{,}080} = 17.72\ ft.$$

The water gage a fan will give is determined from its tip-speed (u), expressed in feet per second. For a diameter of 17.72 ft. and a speed of 90 r.p.m., the tip-speed of the fan is (3.1416 × 17.72 × 90) ÷ 60 = 83.5 ft. per sec. The water gage corresponding to this tip-speed is

$$w.g. = 0.00045\ u^2$$
$$= 0.00045 \times 83.5^2 = 3.14\ in.$$

This is the theoretical water gage developed by the fan. When the fan is properly designed two-sevenths of this theoretical gage will be absorbed within the fan, making the effective water gage in the fan drift, say five-sevenths of the gage estimated from the tip-speed, which gives in this case 5/7 × 3.14 = 2.24 in. as previously estimated.

For a double-intake fan, the diameter of the intake circle can be taken as approximately seven-eighths of the outer diameter of the fan; and the breadth of the fan as three-fifths of the diameter of the intake circle.

Examination Questions Answered

Examination for Mine Foremen, Eighteenth Anthracite District

(Selected Questions)

QUESTION — *Suppose a mine has two openings, one being 70 ft. higher in elevation than the other, on the surface. If the temperature of the air outside is 80 deg. and that inside of the mine 55 deg. will there be a current of air passing and, if so, in what direction will it travel?*

ANSWER — First, assuming that the average temperature of both shafts is the same as that given for the inside of the mine, it is evident that there would then be 70 ft. of outside air column opposed to 70 ft. of an air column in the upper portion of the shaft having the higher elevation at the surface.

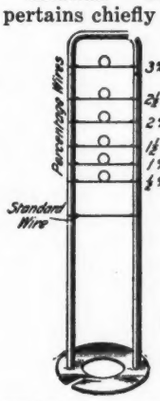
In that case, the 70-ft. unbalanced portion of the shaft column, having a temperature of 55 deg., would be heavier than the outside air column, whose temperature is 80 deg.; and there would result a current of air entering the shaft having the higher elevation and passing through the mine and returning up the shaft having the lower elevation.

In practice, however, the outside air entering a shaft has its temperature lowered or raised to that of the mine, not at once, but gradually, and the average temperatures of the two shafts will depend on their depth, respectively, below the surface.

Assuming natural ventilation only, the original temperature of each shaft being the same as the mine, a circulation will start and air will begin to enter the higher opening, making that shaft the downcast and the lower shaft the upcast. The gradual rise of temperature in the former, due to the warm intake, tends to lessen the effect of the downcast column, however, until a balance is reached between the effective air column of the two shafts and the resistance of the mine airways and the shafts. The circulation involves three air columns; namely, the outside 70-ft. column, and the respective downcast and upcast columns, the net effect of which is opposed by the resistance of the mine.

QUESTION—*Describe the instruments that are most useful in aiding the fireboss in determining the conditions in a mine. Explain the use of each fully.*

ANSWER — The work of the fireboss pertains chiefly to ascertaining the condition of the mine air with respect to gas and moisture, and ascertaining its temperature. To determine the percentage of gas present the fireboss should be equipped with an approved form of safety lamp and an indicator that will show the percentage of gas without requiring him to guess at the height of the flame cap observed in the lamp. The Beard-Mackie sight indicator shows the percentage of gas present in the air by the incandescence of the looped platinum wires. This device, detached from the lamp, is shown in the accompanying figure. The Burrell gas detector is also a valuable instrument for this purpose; but it does not give a sight indication as the previous device. Instead, it depends on the burning out of the gas contained in a sample of the mine air drawn into a tube for that purpose. The gas is consumed by the incandescence of a platinum-wire bridge, which is rendered incandescent by the current from a portable battery.



BEARD-MACKIE SIGHT INDICATOR

The hygrometer is used for determining the percentage of humidity in mine air. This is calculated from the difference of readings of the wet- and dry-bulb thermometers.

The anemometer and the water gage are two instruments used for determining, respectively, the velocity of the air current and the unit pressure producing the circulation.

QUESTION—*How would you ascertain the additional amount of gas given off in the mine when the barometer falls from 30 to 29 in.?*

ANSWER—This question probably refers to the expansion of the gas-charged air contained in old abandoned workings and gobs, due to a sudden fall of barometer. Estimate as closely as possible the volume of the old workings and, after making due allowance for any change in the temperature of the mine during the time of the two observations, find the expansion of this volume due to the change of pressure. For a given temperature, the volume of air and gas varies inversely as the pressure; or, the volume ratio is equal to the inverse ratio of the two readings of the barometer. Thus, the barometer ratio being 29:30, the volume ratio is 30:29, which shows an expansion of 1/29 of the estimated volume of the old workings, due to this fall of barometer.

QUESTION — *How many cubic feet of air should be mixed with one cubic foot of marsh gas (CH_4) so as to render it harmless?*

ANSWER—Marsh gas or methane, not being poisonous, its chief danger, in the mine, is due to the inflammability and explosibility of this gas when mixed with air in proper proportion. The danger is increased by the presence of fine coal dust suspended in the air and is much greater as the coal is softer and more inflammable.

In an anthracite mine, 2½ per cent of marsh gas approaches the danger point and, in order to render this gas harmless, in an anthracite mine, one volume of the gas should be mixed with fifty volumes of air, thereby reducing the percentage of the gas to 2 per cent. If forty volumes of air are mixed with one volume of the gas, the percentage is reduced to 2½ per cent, which is the safe limit.

QUESTION—*An air course is 1,000 yd. long, 7 ft. high and 9 ft. wide; what are the area, perimeter and rubbing surface?*

ANSWER — The sectional area of this airway is 7 × 9 = 63 sq.ft.; its perimeter is 2(7 + 9) = 32 ft. and its rubbing surface 3 × 1,000 × 32 = 96,000 sq.ft.

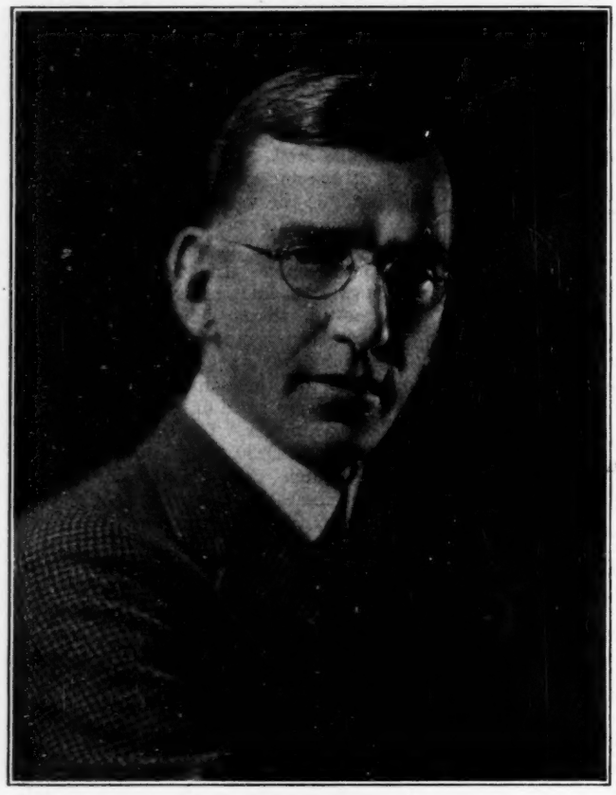
CORRECTION

A typographical error occurred in the answer to the fourth question on page 370, in the issue of *Coal Age*, Feb. 24, 1921. The formula is correctly given but the answer should read 399+ ft. per min., instead of 576+ ft. per min. as appears in that issue.

C. C. Morfit Appointed Secretary of Tug River Coal Operators Association

AT a meeting of the Tug River Coal Operators Association held recently in Welch, W. Va., it was announced that C. C. Morfit, general superintendent of the Solvay Collieries Co., had accepted the position of secretary of the association. Mr. Morfit resigned from the Solvay Collieries, effective March 1, to enter upon his new duties.

The employment of a secretary is the result of action taken at the annual meeting of the association in January and announced at that time. The increased activities and



C. C. MORFIT
Newly Appointed Secretary of Tug River Coal Operators Association

necessity for greater association work appealed to the operators as requiring the full time of a secretary and a fully equipped office for the purpose of centralizing these activities. Mr. Morfit was selected for the place of secretary because of his thorough knowledge of the Tug River and adjacent fields as well as mining conditions throughout the state. He has had extensive experience in connection with the business and legislative side of the coal business as well as practical mining experience. He began his West Virginia experience with the construction department of the B. & O. R.R. in 1899 and went with the Mononga Co. in Fairmont in 1902 as assistant chief engineer. Later he formed the Sinclair-Morfit Co., which dissolved on the death of his partner. For the past three and a half years he has been with the Solvay Collieries Co.

Railroad Taxes in 1920 Were 4½ Times as Much as Net Operating Income

TAXES paid by the railroads in 1920—or those for which they became liable, because some of the roads are behind in their tax bills as well as other bills—amounted to four and one-half times as much as the net operating income which the roads earned for their owners. Total operating revenues for the year, according to the Interstate Commerce Commission statistics made public recently, were $6,225,402,762, the largest in the history of the railroads and $1,041,000,000 greater than for 1919. Operating expenses, however, consumed $5,826,197,474 of this, or $1,406,000,000 more than in 1919, and taxes, $281,380,620, or $83,000,000 more than in 1919. Taxes include $33,349,938 of war taxes for the period from March to December after the roads were returned by the government. After deducting for uncollectible revenues and equipment and joint facility rents this leaves a net operating income, or profit from railway operations, of only $62,264,421.

This compares with an average of over $900,000,000 for the three years preceding the war. It represents a return of about one-third of one per cent on the valuation of $18,900,000,000, which the Interstate Commerce Commission used for the purposes of the rate case. It is less than the roads should earn in one month to receive the 6 per cent which the Transportation Act prescribes as the measure of a fair return on the investment. It is less than one-fourth of the taxes charged by local state and federal governments for the privilege of owning property and doing business and the protection of the laws, and it represents a profit of almost exactly .1 per cent on the gross business done during the year, when the railroads handled more freight and passengers than in any previous twelve-month in their history.

New York Emergency Coal Distribution Committee Reports on Work

EMERGENCY distribution of anthracite in New York City, put into effect last November, ceased Feb. 25, 1921, at the direction of the chairman of the New York Emergency Distribution Committee, J. F. Bermingham, of the Delaware, Lackawanna & Western Coal Co.

Between Nov. 10, 1920, and Feb. 25, 1921, the committee shipped on emergency orders 655 cargoes and 1,262 cars to dealers at rail points, the aggregate being 346,550 gross tons. These figures, and the fact that complaints of anthracite shortage in New York City subsided almost immediately after the emergency committee got to work indicate the efficiency with which the task was performed.

Every Thursday during the period Mr. Bermingham met with a committee of dealers representing the five boroughs, representatives of the Department of Health, and representatives of the Federal Department of Justice. Facts were there submitted upon which the committee of distributors, which met the following morning, would accept allotments and make shipments. Seventeen shippers of anthracite took part in this work, which was maintained until weather conditions and other circumstances combined to make the dealers decline any further shipments, upon which the weekly meetings of dealers and shippers were discontinued.

Co-operation of every interest involved enabled the committee to work effectively, Mr. Bermingham says. Shippers were prompt in acceptance of allotments and quick in shipment; the dealers co-operated to the extent of alloting to others tonnage which they could have placed themselves, while the New York Department of Health arranged so that the most needy should receive the first benefit. The main idea was to look out for the small consumer, and this end was attained.

Mine Workers Oppose Law Which Makes Unions Subject to Suit

THOMAS KENNEDY, district president of the Hazleton mine workers, declares that if the bill of State Senator Woodward, of Philadelphia, permitting unincorporated associations to be sued and allowing judgments to be entered against individuals of such associations, is passed he will advise organized mine workers to withdraw their savings from banks. Philip Murray, international vice-president of the United Mine Workers of America, declares that 235,000 organized miners are against the bill. George Rowan has made the same declaration about the railroad brotherhood.

Harrington Emerson Studies Bituminous Waste; Engineers to Complete Work April 1

HARRINGTON EMERSON has been selected to make the study of waste in the bituminous-coal industry for the American Engineering Council, of which Herbert Hoover is chairman. The work of the Committee on Elimination of Waste in Industry of the council is well under way. A definite scheme of operation went into effect on Feb. 7, and on Feb. 21 reports on the first investigation in each industry were made. The bituminous coal investigation is now reported to be practically complete. The chairman of the committee is J. Parke Channing, of New York, and the vice-chairman in active charge of the inquiry is L. W. Wallace, executive secretary of the council.

New York, New England and Pennsylvania Covered

The field work, covering principally New York, New England and Pennsylvania, will, Mr. Wallace announces, be completed by April 1. There is every reason to believe that the investigation will yield information that will have an important bearing on the nation-wide movement inaugurated by the engineers to wipe out waste in American industry.

In a statement explaining the task of the Committee of Elimination of Waste in Industry, Mr. Wallace said:

"Herbert Hoover when addressing the Federated American Engineering Societies, as president, in Washington in November, said: 'It is primary to mention the three-phase waste in production (1) from intermittent employment, (2) from unemployment that arises in shifting of industrial currents, and (3) from strikes and lockouts. Beyond this elimination of waste there is another field of progress in the adoption of measures for positive increase in production. In the elimination of the great waste and misery of intermittent employment and unemployment we need at once co-ordination in economical groups.'

Committee's Purpose to Find Cause of Waste

"At the organization meeting of the committee in January the purpose of the committee was stated to be: (1) determine the cause of labor, material and equipment waste in industry, the material and equipment phases of the problem to be studied largely in so far as they may cause labor waste; (2) in so far as possible determine the extent of the waste that arises through each major cause; (3) suggest means of removing the cause for such waste.

"It is proposed to give special consideration to the possibility of stabilizing industry. Through stabilization an even demand for production would ensue; hence periods of great fluctuation in employment would not obtain. Many seasonal industries could be reorganized so as to bring about a fairly uniform production throughout the year and thus greatly lessen the evils of unemployment. Ten representative industries have been selected because of their general importance and interest to the public. They are: Bituminous coal, building trade, transportation, men's ready-made clothing, printing, paper, metal trades, textiles, shoes and rubber.

Obtain Information Through Questionnaire

"From three to ten plants of each selected industry are being visited by an experienced engineer, who procures the information desired by the committee. A carefully proposed list of questions is placed in the hands of each field worker. The information obtained by the field investigator is supplemented by such authoritative data as may now exist in the form of reports made by reliable parties or agencies. Through this means sufficient information is to be obtained as to enable the committee to formulate specific conclusions as to the major causes of industrial waste."

The Committee on Elimination of Waste in Industry consists of J. Parke Channing, chairman; L. W. Wallace, vice-chairman; Robert B. Wolf, J. H. Williams, H. K. V. Scheel, Fred J. Miller, Robert Linton, C. E. Knoeppel, Herbert Hoover, L. P. Alford, George D. Babcock, F. G. Coburn, Morris L. Cooke, Harrington Emerson, Ira N. Hollis and E. E. Hunt.

British Coal Industry Is Losing Heavily; Higher Prices or Lower Wages Proposed

AT THE moment the outlook in Great Britain in regard to the labor situation is an extremely serious one, the position being far more dangerous than on the occasion of the last strike. The industry, according to the *Journal of Commerce* (London), as a whole is suffering a loss at the rate of something like £90,000,000 per annum, and in view of the fact that the Cabinet is understood to have decided that as from March 31 the state must be free from all financial liability for the industry, and that entire decontrol must be completed by that date, it necessarily follows that sooner or later, in order to place the industry in an economic position, either pithead prices must be increased or wages reduced to such a level as will make it self-supporting.

Various meetings of owners in the different producing districts have been held to discuss questions arising out of decontrol, and generally it is felt that prices are already high enough, and to further increase them is out of the question at present. The attitude of the owners is that before handing the mines back to them, the government should take off some of the wage advances that they gave almost without protest. Apparently, however, the government has no intention of doing this, and purposes handing back the mines (which were in a fairly prosperous state when taken over) to the owners in an insolvent position.

The miners' leaders are against financial decontrol, as they know it will be out of the question to deal with the owners in the same easy manner as they have done with the government. Even allowing for a certain amount of bluff on the part of the miners' leaders it must always be remembered that although they may know that the conditions of the industry are such as demand a substantial wage reduction, to openly suggest it to the workers would not add to their prestige.

The Miners' Federation has recently sent out a very voluminous circular letter in regard to the proposed new wage basis—which basis, by the way, fixes the wage per shift at the same levels as those in operation previous to the last strike. These letters have been sent out to all lodges to be voted on by show of hands. As the lodges are dominated by a mere handful of local leaders—mainly of the extreme type—it is not difficult to imagine the vote will be all against any wage reduction.

Unless the position is cleared (as a result of the series of meetings that are being held) within the next fortnight or so, then we shall be up against another serious crisis, as the owners are determined to again dominate the position when the mines are handed back to them.

The daily increasing stocks of coke and small fuels on the ground and in wagons, at pits and coke ovens, are constantly resulting in more pits being compelled to work short time, and consequently the shortage of large coal, cobbles and nuts—particularly of the best qualities—is becoming more acute. In some cases the accumulation of these stocks is bringing about a considerable amount of financial embarrassment. This cannot be wondered at when it is pointed out that the cost of producing coke is practically the same as the selling price (55s. per ton on rail at ovens), while in the case of slacks they cost just as much to produce as large coal. Each week onward will see the financial position intensified as, had there been no stocks at the end of January, collieries would have received payment for the bulk of January accounts by now. Since the beginning of this month stocks have increased very substantially,

so that by the end of March the financial embarrassment will be far more acute than at present.

There does not appear to be the slightest chance of any improvement taking place in the demand in the immediate future, and should short time working become more general —as in all probability it will—there is no doubt that the export of large coal cobbles and nuts will have to be entirely suspended from districts other than South Wales and the Tyneside, in order that the fullest possible provision can be made for inland requirements.

Utilities Manifest Increased Efficiency in Fuel Consumption in 1920

COMPARATIVE figures of electricity generated and fuel consumed for 1919 and 1920 by public utility power plants, are shown in the following tables:

PRODUCTION OF ELECTRICITY

	Water Power			Fuel Power		
	Kw.-Hr.	Per Cent of Total	Increase	Kw.-Hr.	Per Cent of Total	Increase
1919	14,600,000,000	37.5	....	24,300,000,000	62.5	.....
1920	16,500,000,000	37.6	13%	27,400,000,000	62.4	12.8%

CONSUMPTION OF FUELS

	Coal, Net Tons	Increase	Fuel Oil, Barrels	Increase	Gas, Cu.Ft.	Increase
1919	35,100,000	....	11,050,000	.....	21,400,000,000	.....
1920	37,200,000	6%	13,080,000	18.4%	24,300,000,000	13.6%

These figures show that the production of electricity by public utility plants in 1920 was 43,900,000,000 kilowatt-hours, an increase of practically 13 per cent over 1919. The percentage of the total kilowatt-hours of electricity produced by water power is the same for both years. The consumption of coal, fuel oil, and gas increased 6, 18.4 and 13.6 per cent, respectively.

If the fuel oil, gas and wood consumed in generating electricity is converted to equivalent coal, the coal consumption in 1919 would be 38,500,000 tons; in 1920 it would be 41,200,000 tons—a gain of 7 per cent. The gain in the production of electricity for the same period was 12.8 per cent, which indicates an increase of efficiency in the consumption of fuels during 1920. On the basis of equivalent coal consumed for each of the two years, a kilowatt-hour of electricity was produced in public utility plants in 1919 by 3.17 lb. of coal; in 1920 by 3.01 lb. of coal. These figures show a gain in economy of fuel consumption of 5 per cent, or a saving of about 2,000,000 tons of coal in the production of electricity in 1920 as compared with the rate of fuel consumption per kilowatt-hour in 1919. The coal required to produe the kilowatt-hours generated by water power in 1920 would be about 25,000,000 tons.

Canada's 1920 Coal Production Exceeded That of Any Previous Year

EARLY statements of the probable coal production of Canada during 1920, made in December, slightly underestimated the quantity of production, and considerably underestimated the values now reported by the operators, according to a statement recently published by John McLeish, chief of the Division of Mineral Resources and Statistics of Canada.

The total production of marketable coal in Canada during 1920 (comprising sales, colliery consumption and coal used in making coke, or used otherwise by colliery operators) was 16,623,598 short tons, valued at $77,326,853, or an average of $4.65 per ton. It was the largest tonnage that has been obtained in any one year.

The total production in 1919 was 13,681,218 tons, valued at $54,413,349, compared with which the 1920 productions shows an increase of 2,942,380 tons, or 21.5 per cent in quantity and $22,913,504, or 42.1 per cent, in value.

The total output of coal including waste and unmarketable slack in 1920 was 16,976,771 tons as against 14,080,655 tons in 1919.

Each of the provinces, with the exception of New Brunswick and Saskatchewan, has shown substantial increases over the previous year's production. Nova Scotia presents an increase of 675,172 tons, or 11.8 per cent; New Brunswick a decrease of 17,944 tons, or 10 per cent; Saskatchewan a decrease of 30,309 tons, or 8 per cent; Alberta an increase of 1,894,811 tons, or 38.2 per cent, and British Columbia an increase of 420,987 tons, or 17.3 per cent.

The exports of coal in 1920 were 2,558,174 tons valued at $18,014,899, or an average of $7.04 per ton, as against exports in 1919 of 2,070,050 tons, valued at $12,438,885, or an average of $6 per ton, showing an increase of 488,124 tons, or 23.6 per cent in quantity.

The total imports of coal of all classes in 1920, "Entered for consumption," as recorded by the Department of Customs, were 18,742,542 tons, valued at $98,033,598, as against imports in 1919 of 17,308,837 tons, valued at $61,160,799. The record shows a slight decrease in the imports of anthracite coal, but an increase in the imports of bituminous.

The estimated consumption of coal based on production, exports and coal imported as "entered for consumption," amounted in 1920 to 33,807,966 tons, as compared with 28 863,017 tons in 1919.

War Department Confers Distinguished Service Medal on Dr. Garfield

ONE of the last acts of the outgoing administration was the award of a distinguished service medal by the Secretary of War on behalf of the President to Dr. Harry A. Garfield "for exceptionally valuable services to the government as Federal Fuel Administrator during the war."

The citation of the War Department accompanying the conferring of the medal upon Dr. Garfield reads as follows: "Dr. Harry A. Garfield, for meritorious and distinguished service in a position of great responsibility. During the progress of the war, by his conduct of the Fuel Administration he stimulated the production, conserved the use, and supervised the distribution of those supplies of fuel necessary for the support and transportation of the armies of the United States, the maintenance of authority, the production of war supplies, and the health and well-being of the civil population upon which the successful prosecution of military activities depended."

Coal Consumed by Locomotives in Transportation Service Only, Calendar Year

(In Net Tons)

Region	1919	1920
New England	4,397,501	4,847,373
Great Lakes	16,338,191	19,324,623
Ohio-Indiana-Allegheny	23,886,290	27,423,858
Pocahontas	4,578,037	5,158,022
Southern	14,685,998	17,170,423
Northwestern	14,383,391	15,538,839
Central Western	15,888,127	17,734,288
Southwestern	6,365,680	6,376,701
ALL REGIONS	100,523,215	113,574,127

Average Cost Per Net Ton, Including Freight, of Coal Consumed by Locomotives in Road Service

(As reported by the Interstate Commerce Commission)

Region	1919 July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Year	1920 July	Aug.	Sept.	Oct.	Nov.	Dec.	Total for Year
New England	$5.26	$5.01	$5.30	$5.59	$5.03	$5.55	$5.69	$9.49	$9.57	$8.84	$7.84	$9.52	$9.95	$8.15
Great Lakes	3.12	3.05	3.27	3.34	3.54	3.40	3.86	4.33	4.58	5.23	4.32	5.30	5.07	4.47
Ohio, Indiana—Allegheny	2.50	2.64	2.75	2.75	3.00	2.82	4.24	3.92	4.28	4.24	3.71	4.77	4.60	3.92
Pocahontas	2.45	2.65	2.59	2.62	2.90	2.68	2.93	4.06	4.48	4.38	3.62	4.74	4.75	3.83
Southern	3.06	3.02	2.91	3.14	3.23	3.19	3.62	3.97	4.42	4.15	3.78	4.61	4.54	3.92
Northwestern	3.75	3.72	3.43	3.70	3.79	3.79	4.64	4.38	4.79	4.43	4.22	4.96	4.83	4.34
Central Western	2.98	3.01	2.85	2.97	3.53	3.12	3.98	3.51	3.57	3.57	3.43	3.59	3.95	3.51
Southwestern	3.45	3.34	3.32	3.47	4.12	3.73	5.39	3.77	4.48	4.39	4.08	4.31	4.23	4.13
ALL REGIONS	3.12	3.11	3.10	3.24	3.48	3.32	3.92	4.25	4.56	4.54	4.05	4.82	4.80	4.20

Number of Bituminous Coal Mines in Operation as of January 1, 1919, 1920 and 1921*

SOME idea of the feverish activity in the coal fields during the high-price spurt of last year is offered by the accompanying figures, showing, as of Jan. 1, on three successive years, the number of mines in operation in the various coal fields. In the Eastern fields—Pennsylvania, Maryland and northern West Virginia—there was an increase during 1920 of 1,020 mines, with an average daily rating or capacity of 4.6 cars. From January, 1920, to January, 1921, the number of bituminous coal mines in the country increased 1,185. Eighty-six per cent of all the new mines were opened in the northeastern fields in which fields the total number of mines is but 47.5 per cent of the country's total. Seventy-seven per cent of the mines, or 912, opened in 1920 were on three railroads, the B. & O., 46 per cent; Western Maryland, 11 per cent, and the Pennsylvania 34.4 per cent.

Compared with January, 1919, the total number of mines increased from 6,857 to 8,722 on January, 1921, a gain of 1,865 in number, or 27 per cent. In southern West Virginia the increase in the number of mines in 1920 was 12 per cent. On the group of roads designated as the Ohio, Western Pennsylvania and Lake the increase was about 9 per cent. In Indiana, Illinois and Michigan the increase was 8 per cent. In the Southeastern territory the gain was only 7 in 1,000, and in the Western group, which includes Iowa and all the trans-Missouri coal fields, there was a decrease from 1,335 to 1,281 or 4 per cent.

GROUP 1. PENNSYLVANIA, MARYLAND, NORTHERN WEST VIRGINIA

	— 1919 — No. Mines				— 1920 — No. Mines				— 1921 —
Railroads	Development	Commercial	Total	Car per Day Rating	Development	Commercial	Total	Car per Day Rating	Total	Car per Day Rating
B. & O.	23	777	800	3,082	26	783	1,009	4,556	1,470	5,378
B. C. & G.	0	1	1	45	0	1	1	50	1	50
B. & L. E.	1	40	41	262	2	41	43	403	4	439
B. & Susq.	0	4	4	95	0	5	5	116	45	126
Beviar & Sou	1	4	5	52	0	4	4	52	4	66
B. R. & P.	14	86	100	720	8	100	108	830	58	703
C. & C.	3	65	68	139	7	67	74	209	119	326
C. & Pa.	0	47	47	187	2	45	47	224	52	223
Cum.	0	9	9	20	2	9	11	24	29	49
C. & Ind.	0	16	18	140	1	18	19	200	17	208
E. B. T.	1	10	11	30	1	10	11	37	10	80
Erie	0	22	22	115	0	23	23	123	25	120
H. & B. T. M.	2	44	46	107	4	41	45	100	46	101
J. & S. C.	0	7	7	35	0	6	6	38	24	63
Ligonier Val.	1	20	21	180	1	21	22	200	25	228
L. E. F. & C.	0	19	19	25	0	23	23	41	30	58
M. & K.	0	28	28	60	1	28	29	93	53	116
Monongahela	0	116	116	584	2	122	124	915	68	1187
N. Y. C.	0	156	156	762	6	165	171	805	232	868
Pitts. & Shaw.	12	40	52	197	6	47	53	234	64	245
P. R. R.	24	1,078	1,102	6,070	65	1,067	1,132	7,457	1,476	10,630
P. S. & N.	1	22	23	38	1	30	31	60	43	60
Pitts. & Sus.	0	20	20	16	0	23	23	16	27	54
W. Aleg.	3	11	14	21	0	14	14	23	19	61
W. Md.	0	74	74	307	0	69	69	404	176	724
W. Va. Nor.	1	12	13	50	4	16	20	65	9	39
Total	87	2,730	2,817	13,339	139	2,778	3,117	17,275	4,137	22,002

GROUP 2. SOUTHERN WEST VIRGINIA

C. & O.	7	476	483	2,380	10	510	520	3,482	558	4,286
N. & W.	1	272	273	1,876	5	271	276	2,392	330	2,995
N. & N.	12	0	12	12	13	0	13	15	12	15
S. V. & E.	0	17	17	97	0	17	17	154	19	220
Virginian	3	76	79	568	0	95	95	884	113	488
Total	23	841	864	4,933	28	893	921	6,927	1,032	8,004

GROUP 3. OHIO, WESTERN PENNSYLVANIA & LAKE

D. T. & I.	0	69	69	69	0	69	69	69	9	12
E. Ky.	0	4	4	9	0	6	6	11	11	12
H. V.	0	144	144	544	10	143	153	605	197	813
K. & M.	6	77	83	401	4	84	88	480	112	673
Montour	0	19	19	299	0	21	21	390	31	448
M. & O.	9	0	9	140	9	....	9	131	22	243
P. & L. E.	1	46	47	414	3	59	62	631	46	423
P. & W. Va.	0	29	29	464	0	29	29	464	34	468
P. L. & W.	0	16	16	12	2	16	18	17	18	29
T. & O. C.	1	91	92	540	2	98	100	718	121	748
Union	0	2	2	244	0	2	2	244	6	251
W. & L. E.	1	60	61	394	1	62	63	530	68	716
Total	18	557	575	3,530	31	589	620	4,290	675	4,838

*Data furnished by courtesy Car Service Division, American Railway Association.

GROUP 4. INDIANA, ILLINOIS & MICHIGAN

	—1919— No. Mines				—1920— No. Mines				—1921—
Railroads	Development	Commercial	Total	Car per Day Rating	Development	Commercial	Total	Car per Day Rating	Total	Car per Day Rating
C. & I. M.	1	6	7	341	1	6	7	382	6	382
C. Ind.	0	4	4	9	0	4	4	3	2	4
C. & E. I.	12	72	84	1,544	11	70	81	1,839	93	1,914
C. & A.	0	30	30	450	0	30	30	319	28	503
Big Four	1	38	39	1,089	2	43	45	1,197	51	1,227
C.T.H. & S.E.	1	43	44	542	3	48	51	515	48	714
C. I. & L.	0	19	19	186	0	23	23	200	24	319
E.St.L. & Sub.	0	2	2	80	0	2	2	100	2	100
E. J. & E.	0	11	11	250	0	11	11	263	11	262
L. T. S.	0	5	5	60	0	5	5	66	*5	66
Ill. Cent.	4	200	204	3,319	7	201	208	3,954	240	2,790
Ill. Sou.	0	0	0	0	0	0	0	0	0	0
L. & M.	0	3	3	220	0	3	3	220	4	221
L.H. & St. L.	0	2	2	8	2	4	6	14	6	16
M. C.	1	6	7	52	6	6	12	56	6	71
P. &P.U.	1	6	7	130	0	6	6	142	5	93
P. M.	0	6	6	70	0	6	6	70	4	60
St. L. & O. F.	0	2	2	90	0	2	2	90	2	100
St. L. B. & E.	0	4	4	45	0	4	4	60	4	60
St. L. T. & E	0	3	3	66	0	3	3	108	4	185
T. St. L. & W.	0	2	2	63	0	2	2	65	2	90
T. P. & W.	0	12	12	30	0	13	13	37	12	37
Wabash.	0	23	23	422	1	19	20	423	31	483
Total	21	499	520	9,066	33	511	544	10,123	590	9,697

GROUP 5. SOUTHEASTERN

A. B. & A.	0	5	5	19	0	5	5	40	5	41
Ala. Cent.	0	1	1	4	3	1	4	2	2	2
A. C. & I.	0	7	7	14	0	7	7	14	6	18
Birm. Sou.	0	3	3	132	0	2	2	9	0	0
C. of Ga.	0	7	7	52	0	7	7	48	14	56
C. C. & O.	10	15	25	124	4	18	22	173	10	166
Interstate	0	31	31	165	0	31	31	137	21	222
K. & T.	0	7	7	60	0	7	7	63	9	74
L. & N.	8	436	444	2,409	24	473	497	3,354	595	4,205
N.C. & St.L	10	40	50	141	11	43	154	143	41	151
S. A. L.	1	0	1	1	1	0	1	1	3	3
Southern	2	251	253	1,101	0	253	253	1,408	282	1,728
T. C.	3	14	17	80	1	16	17	85	19	81
Total	34	817	851	3,402	44	863	1,000	5,477	1,007	6,747

GROUP 6. WESTERN

A. T. & S. F.	14	87	101	575	11	90	101	626	145	776
Ark. Cent.	0	5	5	10	0	8	8	20	16	27
C. R. I. & P.	9	58	67	421	9	58	67	467	78	380
C. G. W.	0	1	1	4	0	1	1	2	0	0
Colo. Sou.	9	36	45	268	9	37	46	283	44	279
C. B. & Q.	6	110	116	2,306	3	116	119	2,974	129	3,031
C. & N. W.	0	28	28	766	0	28	28	766	26	477
Colfax Nor.	0	2	2	19	1	1	2	11	3	18
C. M. & St. L.	2	46	48	398	2	43	45	395	52	205
D. & S. L.	1	12	13	134	0	10	10	136	14	104
D. & R. G.	0	51	51	481	0	47	47	521	50	605
E. P. & S. W.	0	7	7	90	0	7	7	90	7	90
Ft. D.D.M.& S.	0	4	4	3	0	2	2	5	2	7
Ft. S. & W.	0	3	3	23	0	3	3	18	8	12
G. Nor.	1	42	43	183	3	43	46	203	41	36
Inter. Urban	4	1	5	12	0	5	5	33	4	31
K. C. S.	0	20	20	82	1	22	23	89	†23	89
K. C. C. S.	0	2	2	2	0	2	2	2	7	5
Mid. Val.	0	31	31	92	0	31	31	63	30	95
M. Pac.	143	80	223	605	162	94	256	718	151	1,750
M. & St. L.	12	0	12	85	11	0	11	131	11	125
M. W. & S.	1	6	7	43	0	7	7	26	7	90
M. K. & T.	67	15	82	167	70	16	86	203	54	194
K. O. & G.	3	18	21	85	2	20	22	94	25	133
Nor. Pac.	5	46	51	281	8	45	53	297	54	393
N.Mex.Mid.	0	3	3	5	0	2	2	5	2	6
O.W.R. & N.	0	1	1	20	0	1	1	24	3	11
O. S. L.	2	9	11	140	3	9	12	148	13	101
Pac. Coast.	0	2	2	20	0	2	2	29	3	51
Q. O. & K. C.	0	11	11	25	0	9	9	40	9	54
R. I. Sou.	0	2	2	15	0	2	2	15	2	24
R.G. & E.P.	0	2	2	5	0	2	2	5	2	6
S. Pac.	0	3	3	10	0	2	2	5	2	6
St. F. R. & E.	0	2	2	8	0	2	2	10	2	17
St. L. & S. F.	12	149	161	505	15	215	230	643	233	975
T. & P.	0	6	6	39	0	4	4	13	4	42
Union Pac.	0	38	38	321	0	38	38	343	25	279
Total	291	939	1,230	8,246	393	1,024	1,335	9,453	1,281	10,524

SUMMARY

Group 1	87	2,730	2,817	13,339	139	2,778	3,117	17,275	4,137	22,002
Group 2	23	841	864	4,933	28	893	921	6,927	1,032	8,004
Group 3	18	557	575	3,530	31	589	620	4,290	675	4,838
Group 4	21	499	520	9,066	33	511	544	10,123	590	9,697
Group 5	34	817	851	3,402	44	863	1,000	5,477	1,007	6,747
Group 6	291	939	1,230	8,248	393	1,024	1,335	9,453	1,281	10,524
Total	474	6,383	6,857	42,518	668	6,658	7,537	53,545	8,722	61,812

† Previous years figures.

so that by the end of March the financial embarrassment will be far more acute than at present.

There does not appear to be the slightest chance of any improvement taking place in the demand in the immediate future, and should short time working become more general —as in all probability it will—there is no doubt that the export of large coal cobbles and nuts will have to be entirely suspended from districts other than South Wales and the Tyneside, in order that the fullest possible provision can be made for inland requirements.

Utilities Manifest Increased Efficiency in Fuel Consumption in 1920

COMPARATIVE figures of electricity generated and fuel consumed for 1919 and 1920 by public utility power plants, are shown in the following tables:

PRODUCTION OF ELECTRICITY

	Water Power			Fuel Power		
	Kw.-Hr.	Per Cent of Total	Increase	Kw.-Hr.	Per Cent of Total	Increase
1919	14,600,000,000	37.5	....	24,300,000,000	62.5	.....
1920	16,500,000,000	37.6	13%	27,400,000,000	62.4	12.8%

CONSUMPTION OF FUELS

	Coal, Net Tons	Increase	Fuel Oil, Barrels	Increase	Gas, Cu.Ft.	Increase
1919	35,100,000	...	11,050,000	.....	21,400,000,000	.....
1920	37,200,000	6%	13,080,000	18.4%	24,300,000,000	13.6%

These figures show that the production of electricity by public utility plants in 1920 was 43,900,000,000 kilowatt-hours, an increase of practically 13 per cent over 1919. The percentage of the total kilowatt-hours of electricity produced by water power is the same for both years. The consumption of coal, fuel oil, and gas increased 6, 18.4 and 13.6 per cent, respectively.

If the fuel oil, gas and wood consumed in generating electricity is converted to equivalent coal, the coal consumption in 1919 would be 38,500,000 tons; in 1920 it would be 41,200,000 tons—a gain of 7 per cent. The gain in the production of electricity for the same period was 12.8 per cent, which indicates an increase of efficiency in the consumption of fuels during 1920. On the basis of equivalent coal consumed for each of the two years, a kilowatt-hour of electricity was produced in public utility plants in 1919 by 3.17 lb. of coal; in 1920 by 3.01 lb. of coal. These figures show a gain in economy of fuel consumption of 5 per cent, or a saving of about 2,000,000 tons of coal in the production of electricity in 1920 as compared with the rate of fuel consumption per kilowatt-hour in 1919. The coal required to produe the kilowatt-hours generated by water power in 1920 would be about 25,000,000 tons.

Canada's 1920 Coal Production Exceeded That of Any Previous Year

EARLY statements of the probable coal production of Canada during 1920, made in December, slightly underestimated the quantity of production, and considerably underestimated the values now reported by the operators, according to a statement recently published by John McLeish, chief of the Division of Mineral Resources and Statistics of Canada.

The total production of marketable coal in Canada during 1920 (comprising sales, colliery consumption and coal used in making coke, or used otherwise by colliery operators) was 16,623,598 short tons, valued at $77,326,853, or an average of $4.65 per ton. It was the largest tonnage that has been obtained in any one year.

The total production in 1919 was 13,681,218 tons, valued at $54,413,349, compared with which the 1920 productions shows an increase of 2,942,380 tons, or 21.5 per cent in quantity and $22,913,504, or 42.1 per cent, in value.

The total output of coal including waste and unmarketable slack in 1920 was 16,976,771 tons as against 14,080,655 tons in 1919.

Each of the provinces, with the exception of New Brunswick and Saskatchewan, has shown substantial increases over the previous year's production. Nova Scotia presents an increase of 675,172 tons, or 11.8 per cent; New Brunswick a decrease of 17,944 tons, or 10 per cent; Saskatchewan a decrease of 30,309 tons, or 8 per cent; Alberta an increase of 1,894,811 tons, or 38.2 per cent, and British Columbia an increase of 420,987 tons, or 17.3 per cent.

The exports of coal in 1920 were 2,558,174 tons valued at $18,014,899, or an average of $7.04 per ton, as against exports in 1919 of 2,070,050 tons, valued at $12,438,885, or an average of $6 per ton, showing an increase of 488,124 tons, or 23.6 per cent in quantity.

The total imports of coal of all classes in 1920, "Entered for consumption," as recorded by the Department of Customs, were 18,742,542 tons, valued at $98,033,598, as against imports in 1919 of 17,308,837 tons, valued at $61,160,799. The record shows a slight decrease in the imports of anthracite coal, but an increase in the imports of bituminous.

The estimated consumption of coal based on production, exports and coal imported as "entered for consumption," amounted in 1920 to 33,807,966 tons, as compared with 28 863,017 tons in 1919.

War Department Confers Distinguished Service Medal on Dr. Garfield

ONE of the last acts of the outgoing administration was the award of a distinguished service medal by the Secretary of War on behalf of the President to Dr. Harry A. Garfield "for exceptionally valuable services to the government as Federal Fuel Administrator during the war."

The citation of the War Department accompanying the conferring of the medal upon Dr. Garfield reads as follows: "Dr. Harry A. Garfield, for meritorious and distinguished service in a position of great responsibility. During the progress of the war, by his conduct of the Fuel Administration he stimulated the production, conserved the use, and supervised the distribution of those supplies of fuel necessary for the support and transportation of the armies of the United States, the maintenance of authority, the production of war supplies, and the health and well-being of the civil population upon which the successful prosecution of military activities depended."

Coal Consumed by Locomotives in Transportation Service Only, Calendar Year

(In Net Tons)

Region	1919	1920
New England	4,397,501	4,847,373
Great Lakes	16,338,191	19,324,623
Ohio-Indiana-Allegheny	23,886,290	27,423,858
Pocahontas	4,578,037	5,158,022
Southern	14,685,998	17,170,423
Northwestern	14,383,391	15,538,839
Central Western	15,888,127	17,734,288
Southwestern	6,365,680	6,376,701
ALL REGIONS	100,523,215	113,574,127

Average Cost Per Net Ton, Including Freight, of Coal Consumed by Locomotives in Road Service

(As reported by the Interstate Commerce Commission)

Region	1919 July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Year	1920 July	Aug.	Sept.	Oct.	Nov.	Dec.	Total for Year
New England	$5.26	$5.01	$5.30	$5.59	$5.03	$5.55	$5.69	$9.49	$9.57	$8.84	$7.84	$9.52	$9.95	$8.15
Great Lakes	3.12	3.05	3.27	3.34	3.54	3.40	3.86	4.33	4.58	5.23	4.32	5.30	5.07	4.47
Ohio, Indiana—Allegheny	2.50	2.64	2.75	2.75	3.00	2.82	4.24	3.92	4.28	4.24	3.71	4.77	4.60	3.92
Pocahontas	2.45	2.65	2.59	2.62	2.90	2.68	2.93	4.06	4.48	4.38	3.62	4.74	4.75	3.83
Southern	3.06	3.02	2.91	3.14	3.23	3.19	3.62	3.97	4.42	4.15	3.78	4.61	4.54	3.92
Northwestern	3.75	3.72	3.43	3.70	3.79	3.79	4.64	4.38	4.79	4.43	4.22	4.96	4.83	4.34
Central Western	2.98	3.01	2.85	2.97	3.53	3.12	3.98	3.51	3.57	3.57	3.43	3.59	3.95	3.51
Southwestern	3.45	3.34	3.32	3.47	4.12	3.73	5.39	3.77	4.48	4.39	4.08	4.31	4.23	4.13
ALL REGIONS	3.12	3.11	3.10	3.24	3.48	3.32	3.92	4.25	4.56	4.54	4.05	4.82	4.80	4.20

Number of Bituminous Coal Mines in Operation as of January 1, 1919, 1920 and 1921*

SOME idea of the feverish activity in the coal fields during the high-price spurt of last year is offered by the accompanying figures, showing, as of Jan. 1, on three successive years, the number of mines in operation in the various coal fields. In the Eastern fields—Pennsylvania, Maryland and northern West Virginia—there was an increase during 1920 of 1,020 mines, with an average daily rating or capacity of 4.6 cars. From January, 1920, to January, 1921, the number of bituminous coal mines in the country increased 1,185. Eighty-six per cent of all the new mines were opened in the northeastern fields in which fields the total number of mines is but 47.5 per cent of the country's total. Seventy-seven per cent of the mines, or 912, opened in 1920 were on three railroads, the B. & O., 46 per cent; Western Maryland, 11 per cent, and the Pennsylvania 34.4 per cent.

Compared with January, 1919, the total number of mines increased from 6,857 to 8,722 on January, 1921, a gain of 1,865 in number, or 27 per cent. In southern West Virginia the increase in the number of mines in 1920 was 12 per cent. On the group of roads designated as the Ohio, Western Pennsylvania and Lake the increase was about 9 per cent. In Indiana, Illinois and Michigan the increase was 8 per cent. In the Southeastern territory the gain was only 7 in 1,000, and in the Western group, which includes Iowa and all the trans-Missouri coal fields, there was a decrease from 1,335 to 1,281 or 4 per cent.

GROUP 1. PENNSYLVANIA, MARYLAND, NORTHERN WEST VIRGINIA

Railroads	—1919— No. Mines Development	Commercial	Total	Car per Day Rating	—1920— No. Mines Development	Commercial	Total	Car per Day Rating	—1921— Total	Car per Day Rating
B. & O.	23	777	800	3,082	26	783	1,009	4,556	1,470	5,378
B. C. & G.	0	1	1	45	0	1	1	50	1	50
B. & L. E.	1	40	41	262	2	41	43	403	4	439
B. & Susq.	0	4	4	95	0	5	5	116	45	126
Beviar & Sou	1	4	5	52	0	4	4	52	4	66
B. R. & P.	14	86	100	720	8	100	108	830	58	703
C. & C.	3	65	68	139	7	67	74	209	119	326
C. & Pa.	0	47	47	187	2	45	47	224	52	223
Cum.	0	9	9	20	2	9	11	24	29	49
C. & Ind.	0	16	18	140	1	18	19	200	17	208
E. B. T.	1	10	11	30	1	10	11	37	10	80
Erie	0	22	22	115	0	23	23	123	25	120
H. & B.T.M.	2	44	46	107	4	41	45	100	46	101
J. & S.C.	0	7	7	35	0	6	6	38	24	63
Ligonier Val.	1	20	21	180	1	21	22	200	25	228
L. E. F. & C.	0	19	19	25	0	23	23	41	30	58
M. & K.	0	28	28	60	1	28	29	93	53	116
Monongahela	0	116	116	584	2	122	124	915	68	1187
N. Y. C.	0	156	156	762	6	165	171	805	232	868
Pitts. & Shaw.	12	40	52	197	6	47	53	234	64	245
P. R.R.	24	1,078	1,102	6,070	65	1,067	1,132	7,457	1,476	10,630
P. S. & N.	1	22	23	38	1	30	31	60	43	60
Pitts. & Sus.	0	20	20	16	0	23	23	16	27	54
W. Aleg.	3	11	14	21	0	14	14	23	19	61
W. Md.	0	74	74	307	0	69	69	404	176	724
W. Va. Nor.	1	12	13	50	4	16	20	65	9	39
Total	87	2,730	2,817	13,339	139	2,778	3,117	17,275	4,137	22,002

GROUP 2. SOUTHERN WEST VIRGINIA

C. & O.	7	476	483	2,380	10	510	520	3,482	558	4,286
N. & W.	1	272	273	1,876	5	271	276	2,392	330	2,995
N. & N.	12	0	12	12	13	0	13	15	12	15
S. V. & E.	0	17	17	97	0	17	17	154	19	220
Virginian	3	76	79	568	0	95	95	884	113	488
Total	23	841	864	4,933	28	893	921	6,927	1,032	8,004

GROUP 3. OHIO, WESTERN PENNSYLVANIA & LAKE

D. T. & I.	0	69	69	69	0	69	69	69	9	12
E. Ky.	0	4	4	9	0	6	6	11	11	12
H. V.	0	144	144	544	10	143	153	605	197	813
K. & M.	6	77	83	401	4	84	88	480	112	673
Montour	0	19	19	299	0	21	21	390	31	448
M. & O.	9	0	9	140	9	....	9	131	22	243
P. & L. E.	1	46	47	414	3	59	62	631	46	423
P. & W. Va.	0	29	29	464	0	29	29	464	34	468
P. L. & W.	0	16	16	12	2	16	18	17	18	29
T. & O. C.	1	91	92	540	2	98	100	718	121	748
Union	0	2	2	244	0	2	2	244	6	251
W. & L. E.	1	60	61	394	1	62	63	530	68	716
Total	18	557	575	3,530	31	589	620	4,290	675	4,838

GROUP 4. INDIANA, ILLINOIS & MICHIGAN

Railroads	—1919— No. Mines Development	Commercial	Total	Car per Day Rating	—1920— No. Mines Development	Commercial	Total	Car per Day Rating	—1921— Total	Car per Day Rating
C. & I. M.	1	6	7	341	1	6	7	382	6	382
C. Ind.	0	4	4	9	0	4	4	3	2	4
C. & E. I.	12	72	84	1,544	11	70	81	1,839	93	1,914
C. & A.	0	30	30	450	0	30	30	319	28	503
Big Four	1	38	39	1,089	2	43	45	1,197	51	1,227
C.T.H. & S.E.	1	43	44	542	3	48	51	515	48	714
C. I. & L.	0	19	19	186	0	23	23	200	24	319
E.St.L. & Sub.	0	2	2	80	0	2	2	100	2	100
E. J. & E.	0	11	11	250	0	11	11	263	11	262
L. T. S.	0	5	5	60	0	5	5	66	*5	66
Ill. Cent.	4	200	204	3,319	7	201	208	3,954	240	2,790
Ill. Sou.	0	0	0	0	0	0	0	0	0	0
L. & M.	0	3	3	220	0	3	3	220	4	221
L.H. & St. L.	0	2	2	8	2	4	6	14	6	16
M. C.	1	6	7	52	6	6	12	56	6	71
P. &P.U.	1	6	7	130	0	6	6	142	5	93
P. M.	0	6	6	70	0	6	6	70	4	60
St. L. & O. F.	0	2	2	90	0	2	2	90	2	100
St. L. B. & E.	0	4	4	45	0	4	4	60	4	60
St. L. T. & E	0	3	3	66	0	3	3	108	4	185
T. St. L. & W.	0	2	2	63	0	2	2	65	2	90
T. P. & W.	0	12	12	30	0	13	13	37	12	37
Wabash.	0	23	23	422	1	19	20	423	31	483
Total	21	499	520	9,066	33	511	544	10,123	590	9,697

GROUP 5. SOUTHEASTERN

A. B. & A.	0	5	5	19	0	5	5	40	5	41
Ala. Cent.	0	1	1	4	3	1	4	2	2	2
A. C. & I.	0	7	7	14	0	7	7	14	6	18
Birm. Sou.	0	3	3	132	0	2	2	9	0	0
C. of Ga.	0	7	7	52	0	7	7	48	14	56
C. C. & O.	10	15	25	124	4	18	22	173	10	166
Interstate.	0	31	31	165	0	31	31	137	21	222
K. & T.	0	7	7	60	0	7	7	63	9	74
L. & N.	8	436	444	2,409	24	473	497	3,354	595	4,205
N.C. & St.L	10	40	50	141	11	43	154	143	41	151
S. A. L.	1	0	1	1	1	0	1	1	3	3
Southern	2	251	253	1,101	0	253	253	1,408	282	1,728
T. C.	3	14	17	80	1	16	17	85	19	81
Total	34	817	851	3,402	44	863	1,000	5,477	1,007	6,747

GROUP 6. WESTERN

A. T. & S. F.	14	87	101	575	11	90	101	626	145	776
Ark. Cent.	0	5	5	10	0	8	8	20	16	27
C. R. I. & P.	9	58	67	421	9	58	67	467	78	380
C. G. W.	0	1	1	4	0	1	1	2	0	0
Colo. Sou.	9	36	45	268	9	37	46	283	44	279
C. B. & Q.	6	110	116	2,306	3	116	119	2,974	129	3,031
C. & N. W.	0	28	28	766	0	28	28	766	26	477
Colfax Nor.	0	2	2	19	1	1	2	11	3	18
C. M. & St. L.	2	46	48	398	2	43	45	395	52	205
D. & S. L.	1	12	13	134	0	10	10	136	14	104
D. & R. G.	0	51	51	481	0	47	47	521	50	605
E. P. & S. W.	0	7	7	90	0	7	7	90	7	90
Ft. D.D.M.& S.	0	4	4	3	0	2	2	5	2	7
Ft. S. & W.	0	3	3	23	0	3	3	18	8	12
G. Nor.	1	42	43	183	3	43	46	203	41	36
Inter. Urban	4	1	5	12	0	5	5	33	4	31
K. C. S.	0	20	20	82	1	22	23	89	†23	89
K. C. C. S.	0	2	2	2	0	2	2	2	7	5
Mid. Val.	0	31	31	92	0	31	31	63	30	95
M. Pac.	143	80	223	605	162	94	256	718	151	1,750
M. & St. L.	12	0	12	85	11	0	11	131	11	125
M. W. & S.	1	6	7	43	0	7	7	26	7	90
M. K. & T.	67	15	82	167	70	16	86	203	54	194
K. O. & G.	3	18	21	85	2	20	22	94	25	133
Nor. Pac.	5	46	51	281	8	45	53	297	54	393
N.Mex.Mid.	0	3	3	5	0	2	2	5	2	6
O.W.R. & N.	0	1	1	20	0	1	1	24	3	11
O. S. L.	2	9	11	140	3	9	12	148	13	101
Pac. Coast.	0	2	2	20	0	2	2	29	3	51
Q. O. & K. C.	0	11	11	25	0	9	9	40	9	54
R. I. Sou.	0	2	2	15	0	2	2	15	2	24
R.G. & E.P.	0	2	2	5	0	2	2	5	2	6
S. Pac.	0	3	3	10	0	2	2	5	2	6
St. F. R. & E.	0	2	2	8	0	2	2	10	2	17
St. L. & S. F.	12	149	161	505	15	215	230	643	233	975
T. & P.	0	6	6	39	0	4	4	13	4	42
Union Pac.	0	38	38	321	0	38	38	343	25	279
Total	291	939	1,230	8,246	393	1,024	1,335	9,453	1,281	10,524

SUMMARY

Group 1.	87	2,730	2,817	13,339	139	2,778	3,117	17,275	4,137	22,002
Group 2.	23	841	864	4,933	28	893	921	6,927	1,032	8,004
Group 3.	18	557	575	3,530	31	589	620	4,290	675	4,838
Group 4.	21	499	520	9,066	33	511	544	10,123	590	9,697
Group 5.	34	817	851	3,402	44	863	1,000	5,477	1,007	6,747
Group 6.	291	939	1,230	8,248	393	1,024	1,335	9,453	1,281	10,524
Total	474	6,383	6,857	42,518	668	6,658	7,537	53,545	8,722	61,812

*Data furnished by courtesy Car Service Division, American Railway Association.

† Previous years figures.

The Weather Vane of Industry

News Notes Chronicling the Trend of Industrial Activities on Which Depends the Immediate and Future Market for Coal

DOMESTIC business during the past month, according to the Federal Reserve Board, in a statement just issued, has shown "an evident trend of improvement, although such gains as have been made have been moderate and by no means uniform throughout the entire commercial field." Prices, according to this authority, continued to recede in January, but less rapidly than in December. The price index of the Federal Reserve Board, constructed primarily for the purpose of international price comparison, showed a recession for January amounting to approximately 5 per cent, as compared with a 10 per cent decline in December. The statement of the board continues: "Demand for goods has by no means been firmly reestablished, and although there are abundant indications that stocks of goods have been greatly reduced and that a large volume of potential buying is in sight, it has not yet become actual."

Unemployment is the subject of a voluminous report issued under date of March 17 by the Employment Service of the Department of Labor. This report shows nine industries had a decrease in employment in February, ranging from 1.7 per cent for tobacco manufacturers to 7.3 per cent in the iron, steel and allied trades. Railroad repair shops and chemicals and allied products were the other important lines reporting greater unemployment. Five industries reported increases in men at work. The automobile, textile and leather industries leading the list with 18.8, 8.5 and 7.7 per cent gains in employment respectively. Among the cities reporting considerable decreases in employment were Denver, Youngstown, Indianapolis, San Francisco, Grand Rapids, Schenectady, Albany and Perth Amboy. Twenty-nine cities reported increases in employment, the larger percentages being at Chattanooga, Detroit, Peoria, Johnstown and Bridgeport.

The general business situation in New England was reported by the Department of Labor as considerably better than in the latter part of 1920, and there are many indications of greater improvement in the early spring. Running through the reports collected from cities all over the country are statements of construction work that is about to be begun, new housing projects on which work will be started within a few weeks, and numerous government, state and municipal projects for which appropriations have been made, and work to be begun early in the spring.

To Build Huge Dye Plant

Construction of the largest dry color plant in the world is being planned by the E. I. du Pont de Nemours Co., it was announced March 11. The company also is considering the erection of a new unit in its chain of lithopone plants. It is reported the works will be located at Carney's Point, N. J., and will eventually employ in the neighborhood of 30,000 men. Carney's Point is across the Delaware River from Wilmington, where the main plant of the E. I. du Pont de Nemours Co. is located, and several subsidiary plants of the company are located there. The company has recently been expanding its dye manufacturing facilities and a little more than a year ago built a large dye plant at Deepwater Point, N. J., near by.

Passaic Mills Reopen

The Passaic Cotton Mills, New Bedford, Mass., which had been shut down for six months, resumed operations on March 11. The corporation operates seven mills in New Bedford, employing 2,500 persons under normal conditions. No. 4 mill started first on a weekly schedule of forty-eight hours.

Textile Industry Improves

The central Berkshire textile industry is showing signs of recovery. Plants in Pittsfield and Dalton, Mass., employing about 3,000 hands, are running full time. Officials of the Pontoosuc Woolen Co., which was organized in 1826, say the business depression which began Nov. 1 and now apparently ending was the worst and longest in its history.

Ford Plant Has 2,000 More at Work

More than 2,000 employees of the Ford Motor Car Co. were rehired last week. An official stated that about 35,000 workers were now back on their jobs. When the Highland Park factory closed down in December about 55,000 were employed. Production in the factory has been increasing steadily, officials say. An average of 2,000 motors a day are being turned out. The company expects to build 60,000 cars in March.

Fisk Rubber Co. on Full Time

The Fisk Rubber Co. works at Chicopee, Mass., which had been operating on a three-day schedule since Dec. 1, resumed full time March 14 and a wage reduction on both day and piece work was put into effect which amounts to an average of 10 per cent. About 1,800 employees are affected.

N. Y. Shipbuilding Co. Cuts Force

The New York Shipbuilding Co., Camden, N. J., beginning March 11, discontinued night work at its plant and the night force of 200 employees was laid off. The day force also is being materially reduced, the announcement stated, by the laying off of extra gangs employed on war contracts.

C. F. & I. Adds 1,000 Steel Workers

The Colorado Fuel & Iron Co. announced March 11 that owing to improved conditions in the steel industry 1,000 additional men would be employed commencing Monday morning, March 14. It was planned to reopen four idle mills, running two eight-hour shifts.

Carnegie Co. to Close Sharon Plant

Notices of a complete shutdown, beginning Saturday, March 19, and continuing for an indefinite period, were posted at the Carnegie Steel Co. at Sharon, Pa., March 15. About 3,000 men are affected by the suspension.

Dodge Motor Plant Reopens

The plant of the Dodge Brothers Motor Car Co., at Detroit, closed since December, reopened March 17 with 3,500 to 4,000 men. The company normally employs 20,000 men. An effort will be made to reach one-third of the normal production soon. Additional workers are to be added from day to day.

Dearth of Orders and Resultant Low Production of Bituminous May Presage Another Coal Panic

By Paul Wooton
Washington Correspondent

ARE the lessons of the coal panic of 1920 to be disregarded by purchasers of coal? This question is being asked by government officials generally, who are watching with increasing anxiety the low rate of bituminous production. An official warning is understood to be forthcoming from the Interstate Commerce Commission reiterating points previously emphasized by the commission to the effect that a considerable portion of the responsibility for the 1920 situation can be laid at the door of those consumers who failed to contract for their coal when the mines needed orders and coal cars were stored on every siding.

Information reaching Washington is that the number of contracts being made at this time is almost negligible. Despite the predicament in which they found themselves last autumn, New England, the Northwest, public utilities and large consumers generally are staying out of the market. Railroad purchases also are being held at the lowest possible minimum. This is explained in railroad quarters as being due to the financial difficulties which the railroads are experiencing. They already owe coal producers more than $100,000,000. Railroad officials say they are having difficulty in obtaining partial payments under the Winslow Act, which is given as a reason why outstanding accounts are not liquidated and new purchases are not made. Treasury and Interstate Commerce Commission officials, however, take issue with the claim that there is any red tape or delay in meeting payments under the Winslow Act. All that is required is evidence that the claim is just. On March 10 the roads had received $49,702,990.05 of Winslow money.

It also is pointed out that many of the roads are not taking full advantage of the loan provision of the Transportation Act. Officials point out that it is poor policy for the railroads not to exert themselves to store coal at this time. Not only does it safeguard them against higher prices that are certain to come if the whole coal movement is put over until late in the year, but they could be using cars that now are standing idle, and by so doing would not have to use them for the transportation of railroad fuel when these cars could be filled with revenue freight.

The Northwest Has Hope of Lower Freight Rates

Hope of lower freight rates is ascribed as the principal reason why the Northwest is not making contracts. Lake shippers recently requested the carriers to allow them a lower rate. The carriers regarded the request sympathetically, as they are anxious to speed up the coal movement, but they hesitated to make the reduction on their own authority and took it up with the Interstate Commerce Commission. The commission declined to accept responsibility for lowering rates and now the railroads fear that such a reduction would place them in an embarassing position. They were insistent in their demand for the general rate increase and now that they have it they are wondering what the commission will think if they proceed to reduce it of their own accord. Contracts for Lake coal also are being retarded by the fact that there are considerable stocks in the Northwest and by the fact that there is a great deal of coal on the docks.

The unknown factor in the whole situation is the existing rate of consumption. The present situation emphasizes the need for comprehensive consumption figures. A certain government official believes that there would be brisk buying at this time if the public knew the rate of consumption and the cost of production. The public not only remembers the $1.15 coal of the pre-war period but also has clearly in mind the $2.50 coal of 1919. It is believed that if the figures were available, it would show that prices now are as low as coal can be sold, with all prospects for an upturn.

If business should improve quickly later in the year, a repetition of the 1920 situation is believed to be entirely possible. The railroads can handle 500,000,000 tons of coal even if they get a late start on the task, but if business should improve to the point where 550,000,000 tons or more should be necessary, it would be practically impossible for the railroads to handle that amount of coal without interfering seriously with transportation of other commodities.

In connection with this general situation Dr. George Otis Smith, director of the U. S. Geological Survey, makes the following suggestion:

"The consuming public must feel its part of the responsibility in the problem of an adequate coal supply. The coal user, large and small, is too much like the Arkansas man who failed to repair his roof in good weather. Today there is a supply of both coal and cars available, but the consumer seems to prefer to take his chances when the urgency will be great. He hopes for lower prices and thus delays his contracts. This procedure is not helping to put coal production and distribution on a twelve-month basis. A seasonal demand is injurious to coal operator, to the coal miner and to the railroads, and in the end the buyer of coal has to pay more than he would had he co-operated in helping to stabilize coal production and movement."

Thirty Firms Bid $3.50-$4.82 F.O.B. Mines On Coal for Government Fuel Yard

BIDS ranging from $3.50 to $4.82 per ton at the mines were received by the Bureau of Mines Friday, March 18, from thirty coal companies for supplying the Government Fuel Yard with coal for the federal departments at Washington during the year March 31, 1921, to March 31, 1922. Bids were received on bituminous coal, the specifications calling for coal from West Virginia, Pennsylvania and Maryland and gas coal. The Moyer Weaver Co. bid was the lowest submitted. The bids follow:

Steinman Coal Co., 12,000 tons Pennsylvania coal, $4.70.
Pittsburgh Coal Co., 1,600 tons Pa. gas coal, $4.48.
Moyer Weaver Co., full tonnage, $3.50.
Flat Top Fuel Co., 76,000 tons New River coal, $4.20.
P. & S. Coal Co., Inc., 76,000 tons New River, $3.75; 40,000 tons Pa., $3.55; 100,000 to 138,000 tons Pa., $3.65.
Line & Reed, 5,000 tons, $4.55; 36,000 tons Pa., $4.35; 24,000 tons Pa., $4.07; 1,600 tons gas coal, $5.75.
L. A. Snead Co., 25,000 tons West Virginia coal, $4.15.
B. Nicholl & Co., 50,000 tons Pa. coal, $4.09.
Equitable Fuel Co., 50,000 tons Pa. coal, $4.64; 20,000 tons Pa. coal, $4.69; 50,000 tons Pa. coal, $4.08; 75,000 tons Pa. coal, $4.36; 50,000 tons of Pa. coal, $4.47; 24,000 tons W. Va. coal, $4.08; 24,000 tons Pa. coal, $4.08; 20,000 tons Md. coal, $4.64; 25,000 tons Pa. coal, $3.63; 15,000 tons Md. coal, $4.92; 50,000 tons Pa. coal at $3.54; 10,000 tons Pa. coal, $3.75; 15,000 to 20,000 tons Pa. coal, $3.96½.
White Oak Coal Co., 76,000 tons New River, $4.48.
Wilson D. Althouse, 11,497 tons Md. coal, $4.10.
David E. Williams Co., 50,000 tons Pa. coal, $4.18.
Quemahoning Coal Co., 30,000 tons Pa. coal, $3.59.
Cushake Coal Mining Co., 34,500 tons Pa. $4.
Weston-Dodson Co., 50,000 tons Pa. coal, $4.49; 1,600 tons Pa. gas coal, $4.20.
Emmons Coal Mining Co., 50,000 tons W. Va. coal, $3.92.
W. H. Bradford Co., 25,000 tons Pa., $4.45; if in equal monthly portions $4.15; 1,600 tons gas coal, $4.20.
Davis Coal & Coke Co., 39,000 tons Pa., $4.20.
Madeira-Hill Co., 60,000 tons Pa. coal, $4.40.
Consolidation Coal Co., 5,000 tons Md. coal by canal $8.05; 30,000 tons Pa. coal, $4.48; 1,600 tons W. Va. gas coal, $4.76.
Peerless Smokeless Smithing Coal Co., 3,000 tons W. Va. coal monthly, $3.75.
Fayette Smokeless Fuel Co., 36,000 tons, 3,000 monthly, New River coal, $3.90 from April to September, 1921, and $4 from September, 1921, to March, 1922.
H. P. Brydon Bros. Co., Inc., 69,000 tons Md. coal, $4.82; same amount Pa. coal, $4.82; 1,600 tons gas coal, $2.52
C. J. Rowe & Bros., 12,000 tons Md. coal, $4; 30,000 tons each Md. and Pa. coal, $3.50.
Rockwood Coal Co., 20,000 tons Pa. coal, $2.
Lake & Export Coal Co., 76,000 tons New River, $4.48.
Commercial Coal Mining Co., 30,000 tons Pa. coal, $4.30.
James M. McIntyre & Co., 12,000 tons Pa. coal, $3.80.
C. & O. Coal & Coke Co., 3,500 tons monthly W. Va. coal, $4.40.
C. & O. Coal Agency Co., 76,000 tons New River coal, $4.29.
Johnstown Coal & Coke Co., 50,000 tons each Md. and Pa. coal, $4.50.

The freight rate on the coal is $3.18 from the mines to Washington, which will be paid by the government.

Bids Submitted by Twenty Companies for New York City Coal Needs Fail to Cover All Items

THE bids from about twenty coal companies received by the Board of Purchase on March 16 for furnishing coal for fourteen departments of the City of New York did not cover every item in the schedules submitted. The largest proposal for more than three million dollars was that of William Farrell & Son. The bid was submitted for 317,631 tons of anthracite and 85,814 tons of bituminous, contracts to run from April 1, 1921, to March 31, 1922.

There was only one bid received on item No. 1, which provided for furnishing the entire anthracite tonnage f.o.b. mine, and this proposal did not include all of the sizes. Weston Dodson & Co. offered to furnish 146,315 tons of buckwheat No. 1 for $3.89 per ton and 68,023 tons of buckwheat No. 3 for $1.92 per ton. The other tonnages in this item were: Broken, 1,517 tons; egg, 21,578; stove, 12,656; chestnut, 1,616; pea, 5,016; and buckwheat No. 2, 60,960 tons.

On item No. 2, calling for the delivery at the mine of 73,421 tons of run of mine and 12,303 tons of slack, there was only one bidder, B. Nicoll & Co., whose proposal was $3.85 per ton each.

Rubel Brothers, of Brooklyn, submitted a price of $13.50 per ton for furnishing and delivering to the various department delivery points 19,618 tons of egg and 1,486 tons of chestnut coal; $11.25 per ton for 4,122 tons of pea coal, and $9.25 per ton for 29,253 tons of buckwheat No. 1.

Three Firms Bid on Supply for Manhattan Armories

For furnishing and delivering 90 tons of egg coal, 185 tons of chestnut and 2,430 tons of buckwheat No. 1 to various armories in the Borough of Manhattan the Inter City Fuel Co. made a price of $13.85 per ton for egg and chestnut and $8.80 per ton for buckwheat, while the bid of Farrell & Son was $13.63 for egg and chestnut, and $9.59 for the smaller size. The Penn Fuel Co. offered to furnish buckwheat for $8.35 per ton.

For supplying the armories in the Bronx with 952 tons of buckwheat Farrell & Son bid $9.35 per ton and V. H. Youngman & Co.'s bid was $9.74.

Prices bid on 2,184 tons of buckwheat No. 1 by four dealers for the armories in Brooklyn ranged from $8.99 to $9.74.

The Inter City Fuel Co. submitted a price of $6 per ton for delivering 27,040 tons of buckwheat No. 2 by barge in cargo lots of about 500 tons each at the foot of East 29th Street for Bellevue Hospital. Farrell & Son's bid on this tonnage was $7.22 per ton. For furnishing various hospitals with stove and chestnut coal the bid of William Farrell & Son was $13.63 per ton and the Inter City Co. $13.85 per ton.

For delivering 3,248 tons of buckwheat No. 2 to Gouverneur Hospital three bids were received as follows: Penn Fuel Co., $7.99 per ton; Inter City Co., $7.90, and Farrell, $7.95; while for furnishing Harlem Hospital for 5,600 tons of the same size of coal Whitney & Kemmerer made a price of $7.65 per ton, against $7.90 and $7.95 by the Inter City Co. and Farrell, respectively.

Bids for Brooklyn Lower Than for Manhattan

For delivering by barge to Blackwell's Island Penitentiary 3,360 tons of buckwheat No. 3 the prices submitted ranged from $5 to $6.49 per ton; 2,352 tons of semi-bituminous, $7.05 to $9.19, and 168 tons of stove coal from $11.85 to $13.25 per ton.

Bids ranging from $13.63 to $14.05 were received for furnishing the Dock Department with chestnut coal.

For furnishing the Fire Department with egg and chestnut coal in small tonnages, the bids, by boroughs, ranged as follows: Manhattan, $13.63 to $14.30; Brooklyn, $13.50 to $14.14; Bronx, $13.63; Queens, $13.50 to $15.10; Richmond, $14.50 to $14.85.

Francis M. A. Leach bid $8.12 per ton for 7,223 tons of semi-bituminous coal for the fire boats while Farrell bid $10 per ton for 3,079 tons for the same purpose. The latter concern submitted a price of $9.99 per ton for twenty tons of George's Creek, Cumberland blacksmith coal.

Delay Trial of Indicted Coal Men; Outside Defendants Fight Removal to Indiana

PROBABILITY of an early trial of coal operators, dealers and miners indicted under the Sherman Anti-Trust law by Federal Grand Jury was killed by announcement of attorneys for the defendants living outside of Indiana that they would fight removal of their clients to that state. The decision was announced to L. Ert Slack, Special Assistant Attorney General of the United States, who by request attended the conference of attorneys held in Chicago Monday, March 14.

The Chicago conference, according to Mr. Slack, was attended by the leading attorneys of Chicago, Pittsburgh, St. Louis, Philadelphia and other cities outside Indiana where defendants to the suit reside. Attorneys representing the defendants in Indiana also were present.

The action, according to Mr. Slack, probably will result in long delay in the case, as it will take considerable time for the hearing of removal cases in each of the districts where the defendants reside, these being in Illinois, Ohio, Pennsylvania, Kentucky and Missouri, and in some of these states removal proceedings will be necessary in more than one district, as the state has several districts.

Decision Goes Against Alabama Miners

GOVERNOR THOMAS E. KILBY, sole arbitrator in the so-called Alabama strike, announced his award on March 19. The mines had been working almost full time for several months, but the strike, according to the union, was nevertheless still in full tilt when the Governor agreed to arbitrate it.

The Governor's personal representatives in the investigation were W. T. Sheehan, editor, *Montgomery Advertiser;* Richard Hobbie, whoesale grocer, and John W. Durr, wholesale druggist, all of Montgomery. The award declares that freedom of contract should be inviolate, but that agreements may be entered into by mutual consent.

The Governor declares that the existing methods of adjusting grievances are fair and equitable, that operators are under no obligation to take back the striking miners, though they are recommended to do so as soon as it can be done without displacing men who are now working. He adds that "as this strike was called wrongfully and without the slightest justification, the organization of the United Mine Workers of America is responsible for the present strikers being without employment and therefore the organization should support the strikers until they find work."

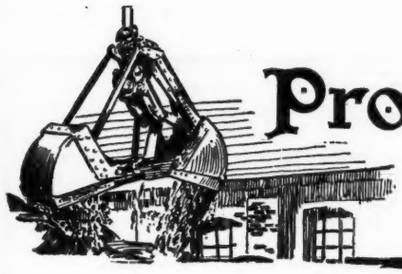
The committee said "We do not question the right of men to organize voluntarily, but we do question the asserted right to force other men against their wishes into the organization."

16 Mingo Miners Cleared of Murder Charge

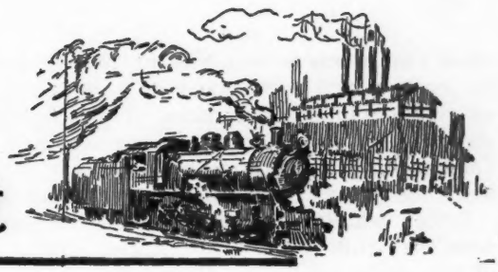
SIXTEEN coal miners charged with murder in connection with the wholesale shooting at Matewan, W. Va., last May were found not guilty at Williamson, March 21. The case was submitted to the jury late Saturday afternoon, March 19.

The trial grew out of the killing of seven detectives of the Baldwin-Felts agency who had been assigned to the district during the mine-strike troubles.

The trial lasted more than a month, with detailed testimony regarding the labor situation at the time and the revolver battle in which the detectives were slain.



Production and the Market



Weekly Review

ENTIRE lack of interest in the market best describes the attitude of the coal man today. The buyer has not yet come to a realizing sense of values and while many are beginning to ask for quotations on next year's business they are holding their ideas down to the level of the spot market and refuse to talk business for the year at figures the coal shipper thinks are reasonable on contracts.

It is a reminder of old times for the spring spot market to sag so far below contract prices and it is going to take a little more than the usual time for buyers and sellers of coal to shake down to the new basis after so many years of the other way around. As April approaches it is interesting to note that production for the coal year just closing is estimated by the Geological Survey as 523,000,000 net tons of bituminous coal as compared with 486,899,000 tons a year ago and 552,041,000 tons in 1918-19, the best previous coal year.

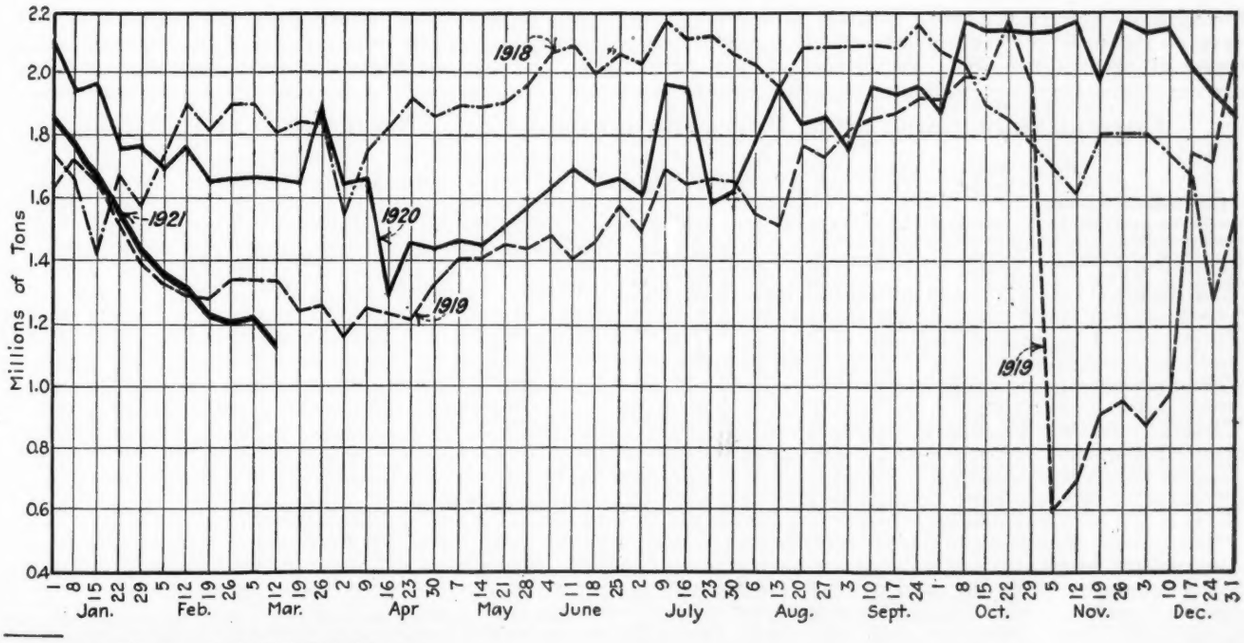
It is the next coal year, however, that really is of concern. It is felt that unless something is done to break the present deadlock in buying, the deficit in stocks may become so great as to precipitate a serious condition next fall. Seeking to penetrate the psychology of the coal buyers' strike, many in the trade find an absolute lack of understanding on the part of some consumers of the real reasons for coal prices and a resultant dogged determination to stay out of market until prices are lower, and on the part of others a keen appreciation of present conditions and a desire to play the game to a finish, patiently waiting for the best price that can be obtained.

Production from Now on a Matter of "Hunch"

The real difficulty now is that consumers are without knowledge as to how much coal they are going to need during the coming year—that is, they don't know whether to figure on as much as last year or only half as much. The buyer is uncertain. It is as if the coal man were faced with the necessity of deciding now on how many tons he will produce this year and then backing his judgment with his money by mining the coal and holding it until called for.

Many in the trade have adopted a half-hearted attitude toward the situation, saying that it is a matter of indifference to them whether the buyer takes the coal now at bottom prices or next autumn and winter at famine prices. In part there is an element in the

Daily Average Production of Bituminous Coal*



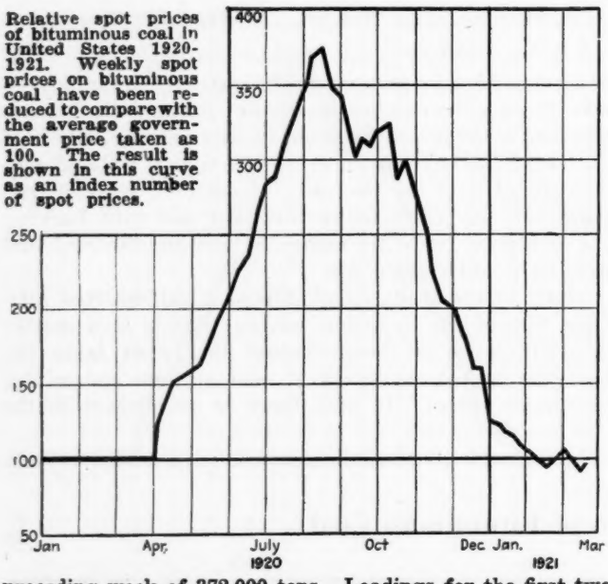
*From weekly report of Geological Survey.

trade that welcomes our present idleness as an opportunity to visit Florida and as holding out excellent chances of famine prices later. To break down the resistance of buyers of coal no other argument is offered (and that but half-heartedly) save that it is safer to stock up now and avoid the danger ahead.

Prices exhibit no marked changes. *Coal Age* index rose one point, from 98 to 99, this week. The cause of this slight rise is traced to stiffening of some Western circulars on spring trade. So "wabbly" is the market that a few cars of surplus has an undue effect. The recession of Pocahontas mine run at Columbus, while the same coal was picking up in price in Chicago, shows both the uncertainty of the market and its sensitiveness to local conditions.

BITUMINOUS

Production in the week ended March 12 was the lowest of any period in the last four years, with the exception of the 1919 strike period. The Geological Survey places the total output at 6,891,000 net tons, a decrease from the last preceding week of 372,000 tons. Loadings for the first two days of the week of March 14-19 indicate a further decrease of about 4 per cent. The temper of both buyer and seller portends a drop to 6,000,000 tons as a starter for the new coal year which begins on April 1.



Relative spot prices of bituminous coal in United States 1920-1921. Weekly spot prices on bituminous coal have been reduced to compare with the average government price taken as 100. The result is shown in this curve as an index number of spot prices.

Mine reports show that the spot market as a whole is practically non-existent. Some producers are still forcing unsold coal on their connections. This and a slight strengthening in steam sizes caused by lowered domestic production constitute the only price changes in the tonnage that is now moving. Spot quotations largely represent minimum figures at which producers can mine coal, and in some instances this range is brought below production cost by the policy of forcing sales.

Over the country approximately 60 per cent of full time operation is being lost because of lack of orders. And while the soft coal mines are down, the railroads are storing empty and idle coal cars on every available siding. The Pennsylvania Railroad reports that the number of

Estimates of Production

FROM THE WEEKLY REPORT OF THE GEOLOGICAL SURVEY
(NET TONS)

BITUMINOUS COAL

Total Bituminous, Including Coal Coked

	1921		1920	
	Week	Coal Year to Date	Week	Coal Year to Date *a*
Feb. 26*b*	7,432,000	490,605,000	10,120,000	437,597,000
Daily average	1,239,000	1,756,000	1,687,000	1,560,000
Mar. 5*b*	7,263,000	497,868,000	10,304,000	447,900,000
Daily average	1,210,000	1,745,000	1,717,000	1,564,000
Mar. 12*c*	6,891,000	504,759,000	10,277,000	458,178,000
Daily average	1,148,000	1,732,000	1,713,000	1,567,000

(*a*) Less 2 days' production during first week in April to equalize number of days covered for the two years. (*b*) Revised from last report. (*c*) Subject to revision.

ANTHRACITE

	1921		1920	
	Week	Coal Year to Date	Week	Coal Year to Date *a*
Feb. 26	1,816,000	83,491,000	1,767,000	84,053,000
Mar. 5*b*	1,902,000	85,393,000	1,604,000	85,657,000
Mar. 12	1,926,000	87,319,000	1,648,000	87,305,000

(*a*) Less 2 days' production during first week of April, to equalize number of working days covered for the 2 years. (*b*) Revised from last report.

BEEHIVE COKE

Week Ended				
Mar. 12 1921*a*	Mar. 5 1921 *b*	Mar. 13 1920	1921 to Date	1920 *c* to Date
162,000	178,000	407,000	2,257,000	4,527,000

(*a*) Subject to revision. (*b*) Revised from last report. (*c*) Less 2 days' production during New Year's week to equalize number of days covered for last two years.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

	Market Quoted	Gov't Price	Feb.22 1921	Mar.15 1921	Mar. 22 1921†
Low-Volatile, Eastern					
Pocahontas mine run	Columbus	$2.35	$3.50	$3.50	*$3.25*
Pocahontas lump	Columbus	2.60	6.00	5.50	5.50
Pocahontas mine run	Chicago	2.35	3.00	3.65	**3.50@ 4.75**
Pocahontas lump	Chicago	2.60	3.90	5.00	4.50@ 5.50
*Smokeless mine run	Boston	....	6.00	5.65	**5.75@ 6.00**
Clearfield mine run	Boston	2.95	2.60	2.50	2.00@ 3.00
Somerset mine run	Boston	2.95	3.15	3.00	2.40@ 3.60
Pool 1	New York	2.95	3.40	3.25	**3.10@ 3.50**
Pool 1	Philadelphia	2.95	3.20	3.50	3.50
Pool 1	Baltimore	2.95	3.15	3.00	**3.00@ 3.15**
Pool 9	New York	2.95	2.75	3.05	*2.50@ 3.00*
Pool 9	Philadelphia	2.95	3.00	3.25	*3.00@ 3.15*
Pool 9	Baltimore	2.95	3.00	2.85	2.75@ 3.00
Pool 10	New York	2.95	2.60	2.45	**2.35@ 3.00**
Pool 10	Philadelphia	2.95	2.75	2.50	2.25@ 2.75
Pool 10	Baltimore	2.95	2.50	2.50	*2.25@ 2.50*
Pool 11	New York	2.95	2.40	2.20	2.15@ 2.25
Pool 11	Philadelphia	2.95	2.25	2.30	2.25@ 2.35
Pool 11	Baltimore	2.95	2.50	2.30	2.25@ 2.35
Pool 71	New York	2.95	3.15	2.75	2.50@ 3.00
Pool 71	Philadelphia	2.95	....	2.75	2.75
Pool 71	Baltimore	2.95	3.15	2.65	....
High-Volatile, Eastern					
Pool 34	New York	2.50	2.10	2.10	*1.75@‡2.25*
Pool 34	Philadelphia	2.50	2.25	2.15	*2.00@ 2.25*
Pool 34	Baltimore	2.50	2.15	2.00	2.00
Pittsburgh mine run	Pittsburgh	2.35	2.35	2.25	2.00@ 2.50
Pittsburgh sc'd gas	Pittsburgh	2.35	2.70	2.85	2.75@ 3.00
Kanawha mine run	Columbus	2.70	2.60	2.25	2.25
Kanawha lump	Columbus	$2.95	$3.50	$3.50	**$3.25**
Hocking mine run	Columbus	2.50	2.25	2.25	*2.15*
Hocking lump	Columbus	2.75	3.65	3.50	*3.25*
Pitts. No. 8 mine run	Cleveland	2.35	2.40	2.15	2.00@ 2.25
Pitts. No. 8 lump	Cleveland	2.60	3.85	3.50	3.25@ 3.75
Midwest					
Frankl n, Ill., mine run	Chicago	2.35	2.75	2.85	**3.25@ 3.50**
Franklin, Ill., lump	Chicago	2.55	3.80	3.40	**3.45@ 3.65**
Central Ill., mine run	Chicago	2.35	1.85	2.00	1.50@ 2.50
Central Ill., lump	Chicago	2.55	2.60	2.50	2.00@ 3.00
Ind. 4th Vein mine run	Chicago	2.35	2.20	2.65	2.25@ 3.00
Ind. 4th Vein lump	Chicago	2.55	3.30	3.15	2.75@ 3.50
Ind. 5th Vein mine run	Chicago	2.35	2.15	2.50	2.25@ 2.75
Ind. 5th Vein lump	Chicago	2.55	3.10	2.75	2.25@ 3.25
Standard mine run	St. Louis	2.35	1.95	1.90	*1.75@ 2.00*
Standard lump	St. Louis	2.55	2.60	2.60	2.50@ 2.75
West Ky. mine run	Louisville	2.35	2.15	2.45	**2.50**
West Ky. lump	Louisville	2.60	3.25	3.15	3.15
South and Southwest					
Big Seam mine run	Birmingham	2.45	3.10	2.95	2.95
Big Seam lump	Birmingham	2.75	3.75	3.75	3.75
S.E. Ky. mine run	Louisville	3.00	2.75	2.75	2.75
S.E. Ky. lump	Louisville	3.25	4.00	3.75	*3.50@* 3.75
Kansas mine run	Kansas City	3.50	4.50	4.50	4.50
Kansas City lump	Kansas City	4.00	5.50	5.50	5.50

* Gross tons, f.o.b. vessel, Hampton Roads. Quotations on Pocahontas mine run, Boston market, heretofore quoted included both Pocahontas and New River and will henceforth be quoted as West Virginia "Smokeless."

† Advance over previous week shown in **heavy type**, declines in *italics*.

stored good-order freight cars increased from 14,065 on Dec. 15 to 89,258 on Feb. 28, and estimates that on all roads the number reaches 392,550 cars.

Production of bituminous coal in the Appalachian region in the week of March 5 was 4,206,000 tons, compared with an average in 1920 of 6,456,000 tons and with 5,600,000 tons in 1919, the lowest rate in five years. Despite the general slowness of the movement of soft coal New England continues to take around 3,000 cars a week, the figures for the week ended March 12 being 3,208, compared with 2,256 a year ago. New England is getting the greater part of her coal by all-rail now.

ANTHRACITE

The one bright spot in the coal fields is the anthracite region, where output is at war-time levels. The continued demand for hard coal promises to put the coal year ended April 1 next ahead of last year. The loss of 3,000,000 tons occasioned by the miners' vacation strike of last September has been overcome and with production close to 2,000,000 tons a week—it was 1,926,000 in the week of March 12, and 1,902,000 the preceding week—we find the hard-coal region the busiest place in the country, bar none.

Although the Reading and Navigation companies have announced that they will make no summer discounts, Williams & Peters and the Lackawanna will make the customary reduction and retail dealers generally have adopted a policy of announcing drops in delivered prices. It is expected that by this means household buying can be sustained well into April.

COKE

Production of beehive coke dropped from 178,000 tons in the week of March 5 to 162,000 tons the second week of the month. In the corresponding week of March last year output was 407,000 tons. Total production of beehive coke this year to date is but half that of last year. This corresponds to the activity in the iron and steel industry, where, now that the Steel Corporation is more than half shut down, output is at lower levels than recorded even in 1907. Coke prices are sliding downward and it is understood that wage reductions in addition to those made by Rainey are being quietly made by other independents.

Reports From the Market Centers

New England

BOSTON

Expiring Contracts Force Operators to Reach Out for Business—New England Market at Standstill—Hampton Roads Agencies Show Interest — Anthracite Basis Not Yet Determined.

Bituminous—There are few developments to report. Business in all lines is confronted with the "buyers strike" and the coal trade is certainly no exception. There is no material decrease in the reserves of steam coal and the prospect is that it will be well into the summer before consumers resume purchasing. Railroads also are well-stocked and there is small chance for increased consumption while traffic conditions remain as they are. We are sure to see a marked decline in receipts both all-rail and by water soon after April 1 when existing contracts in large numbers expire.

Not only in central Pennsylvania but in West Virginia the operating interests who can command any comprehensive business are reaching out for it with the longest of arms. Mines that are now operated on a 25 and 35 per cent basis, relying largely upon old contracts, find themselves facing complete shut-down and are once more re-casting their figures in the effort to determine the absolute minimum they can afford to quote for the sake of keeping their men. A few are striving to get orders on a 6 months basis, thereby netting a lower price than for delivery through the twelve-months period, this on the assumption that conditions in the fall are bound to show improvement.

In this territory, however, salesmen are able to accomplish next to nothing. The very few manufacturers who are running on small reserves are able to pick up stray lots at what to them are very satisfactory prices. Otherwise the market here is at a complete standstill.

With the end of March the smokeless agencies are conducting a close canvass of buyers in New England. There is a disposition to fix $3.50 as a net ton figure at the mines, but the recent bids for Navy supply at 50c. less have been noised about and it is hard to see where business in any volume can be closed on the higher basis. The fact remains, however, that the Hampton Roads agencies are keeping in touch with buyers and are getting ready to use their slight advantage over all-rail shippers for all it is worth. Coastwise freights are certain to be on a low range, the limit downward being controlled only by costs.

Cargoes of New River on consignment here have been sacrificed at prices well down to $7 delivered. Certain municipal institutions have profited by this, for few industrial plants have been in position to buy. Pier reports show continued accumulation at Norfolk and Newport News, but output is being better regulated and it is unlikely we shall see many more spot prices f.o.b. Hampton Roads at less than $5.50 @$5.75 per gross ton.

Current prices are shown in the Weekly Review.

Anthracite—All but three of the larger producing companies have now announced a reduction in prices, the spring modification amounting in most cases to 50c. There is no retail demand, however, and the dealers are not quite ready to take on coal in any volume. Very few sales are being made, even at new prices, but it is anticipated that when the program is all straightened out and the largest companies follow the lead already established there will be more confidence in buying. Most retailers have large stocks on hand at winter prices and are not anxious to reduce to the public until there is fairly clear going ahead.

BIRMINGHAM

No Improvement in Market Conditions —Spot Sales Extremely Light—Prices Without Material Change.

There are but few inquiries coming into the local market either for steam or domestic coal, and the general status is without change from a week ago. Relatively little coal is moving and idleness at the mines is rather on the increase. Indications of a more active market in the near future are not discernible.

Domestic producers have not yet announced the spring schedules usually effective April 1, but these figures will probably be available in a week or so.

Pratt mine run is being quoted $3.25 @$4; Black Creek and Cahaba $4@ $4.50, lump $5@$6; Carbon Hill mine run $3.25, lump $4.25; Big Seam mine run $2.70@$3.25 and lump $3.25@$4.25; Corona mine run $3.35@$3.75.

Tidewater

NEW YORK

More Anthracite Reductions Announced — Brisk Demand Expected Soon — Steam Coals Being Stocked — Bituminous Market Quiet.

Anthracite—Two more companies—Delaware, Lackawanna & Western Coal Co. and the Lehigh & Wilkes-Barre Coal Co. announced reductions of 50c. per ton in the prices of the domestic coals last week, at the same time reducing the prices for steam. Several retail dealers in New York and Brooklyn also reduced their prices 65c.@75c. Many independent mines are being operated on a curtailed schedule, if at all. These coals in most instances are being quoted slightly above the new price lists of the large companies. It is hard to move pea and some independent shippers ask for offers while others are quoting as low as $5.50.

Curtailed operation at many of the

collieries has resulted in less of the steam sizes being pushed on the market. Some operators are stocking their surplus. The general trend of the market for buckwheat is $2.50@$3.25; rice, $2@$2.50, and barley from 75c. up.

The new retail prices are:

	New York	Brooklyn
Broken	$12.75	$13.00
Egg	12.75	13.00
Stove	13.00	13.25
Chestnut	13.00	13.25
Pea	10.75	11.00
Buckwheat No. 1	8.10	8.10
Buckwheat No. 2	7.10	7.10
Buckwheat No. 3	6.10	6.10
Soft	9.00	9.00
Cumberland	10.00	....
Red Ash stove and chestnut	13.75	....

The prices for New York do not include putting the coal in bins while those for the domestic coals in Brooklyn include this extra work.

Current quotations for company coals per gross ton at mine and f.o.b. Tidewater, lower ports, are:

	Mine.	Tide.
Broken	$7.10@$7.75	$9.71@$10.36
Egg	7.10@ 7.75	9.71@ 10.36
Stove	7.35@ 8.10	9.96@ 10.71
Chestnut	7.40@ 8.10	10.01@ 10.71
Pea	5.65@ 6.40	8.12@ 8.87
Buckwheat No. 1	3.50@ 4.25	5.97@ 6.72
Rice	2.50@ 3.50	4.97@ 5.97
Barley	1.50@ 2.25	3.97@ 4.72

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight.

Bituminous—While demand is extremely quiet many look for a change around May 1 when the surplus stocks of manufacturers may run low.

There is considerable coal at local docks and embargo orders were in force at some of the piers. However, the supply has not proved troublesome as yet. Contract coals move easily and shippers of the higher grades do not find it hard to dispose of their holdings.

Salesmen report considerable coal in the inland yards but say that large consumers show no disposition to talk buying. Unless there is an improvement in the situation early in the summer coal men predict a runaway market in the fall and winter when the railroads wil be unable to move coal fast enough.

Operators continue to hold off on contracts where it means they would have to tie up more than a certain amount of their output. Most of them are holding tight to about $3.75@$4.25, according to grade, for new contracts.

The various pools were quoted about as follows at the local piers: Pool 1, $6.25@$6.50; Pool 9, $6@$6.25; Pool 10, $5.90@$6; Pool 71, $6@$6.25; Pool 11, $5.30@$5.50; Pool 18, $4.50@$5 and Pool 34, $4.50@$5. Mine quotations are shown in the Weekly Review.

BALTIMORE

Business Drags — Problems Both on Spot and Contract Relations — Everybody in Waiting Mood—Hard Coal Conditions Disturbed.

Bituminous—Business is slow in every line and is reflected in all classes of soft coal trading. Everybody is in waiting humor. The deterrent to contract business in many cases is the fact that coal of high grade can be bought on the spot market much cheaper than offered on contract.

Some contracts are being made, it is true, but they are not in the volume expected. Best steam fuels are offering on contract around $4@$4.25 for the most part, with some demands as high as $4.50 for specialized coals. And yet these coals are to be had in the open market as low as $2.50 in some cases, and the general run is $2.75@$3 per net ton. No one seems especially interested in buying largely at any price, however.

The export business still lags. There have been some days on which the Curtis Bay pier has reported no dumpings. For the first sixteen days of March the total export loading in Baltimore was 52,032 tons cargo and 4,643 tons bunker.

Anthracite—The question of price is causing disturbance in hard coal circles. Many dealers have felt that there would be no spring drop in wholesale prices and therefore no retail drop—at least that while wholesale prices might change the adjustment would give about the same purchasing basis as at present. A few Baltimore dealers, however, have followed the lead of some Philadelphia retailers in predicting a cut of about $1 a ton in spring retail prices. These dealers have advised customers not to buy at the present range. This has caused disturbance, especially to the man with a fair stock of coal on hand bought at high wholesale prices and with no present demand to absorb it.

PHILADELPHIA

Anthracite Demand Halted — Retailers in Price War—Bituminous Stagnant—Buyers Out of Market—Spot Prices Unchanged.

Anthracite—Retail trading is close to demoralization, due to severe price cutting. Recently several of the larger concerns made a flat cut of $1 in their effort to secure business. The lowest prices heard so far are $13.75 for stove and nut, and $10 for pea.

Despite these drastic cuts there is no buying whatever on the part of the consumer. Those with the money to buy, seem to take the stand that since the dealers have cut so deeply before April 1 they are likely to go even further. All yards are filled with coal and hardly anything is going out.

Yard capacity is so small that it is only a question of time when the mines will have to close down. Even now some of the lesser independents are offering stove and nut at $7.75. Among these shippers pea at $6 is a common quotation, and occasionally a little less.

While only one of the big companies has come out with a definite statement that they will not reduce prices on April 1, the fact that one of the other companies has now reduced steam sizes very considerably carries out the prediction that a reduction in steam coal would have to be taken care of by holding the family sizes at the old figures. It is believed the real motive behind the reduction is simply to indicate what the company's contract prices will be on these sizes for the coming year, as they are understood now to be closing contracts on the basis of these figures. Independents are still endeavoring to move buckwheat for $3@$3.25, and we have even heard of a few sales at $2.75.

Company mine prices per gross ton for line shipment and f.o.b. Port Richmond for Tide are as follows:

	Line.	Tide.
Broken	$7.75	$10.45
Egg	7.75	10.45
Stove	8.05	10.70
Nut	8.05	10.70
Pea	6.40	8.80
Buckwheat	3.50	6.00
Rice	2.50	5.00
Boiler	2.00	4.40
Barley	1.50	4.40

Bituminous—The stagnant condition of the market still prevails, with practically no inquiry whatever. Spot prices continue unchanged, although occasionally quotations are heard of Pool 9 at $3, but the average is closer to $3.15. Most producers seem to realize that they will simply have to bide their time for a revival of trade and that cut prices will be of no effect against the present mood of buyers. One important producer has made the statement that in his belief 90 per cent of the coal now being sold at present market prices is being moved at a loss, and his company refuses to make any sales for less than $3.50.

Brokers are beginning to receive more tonnage to be offered on a contract basis and we have heard of some fair coals being quoted for the year at $4, but it is the exception to hear of any agreements being closed.

Coke—Inactivity prevails, as the iron trade shows no signs of improvement. Recent quotations for 72 hr. have been $5.75 and 48 hr. $5.

BUFFALO

Trade Inactive—Consumers Urged to Buy—Wage Reductions Talk—Surplus Anthracite Growing.

Bituminous—Consumers seem to have taken the idea that prices are going still lower, even with most coal selling below cost, so they are holding off and using up what they have on hand. Shippers agree in urging all consumers to keep at least a three-months' supply on hand, so that if there is any difficulty they will be prepared for it.

The foolishness of not buying coal now is astonishing. If the railroad men strike coal prices will come up at once and if they accept the cut in wages that will be the beginning of better business. At any rate prices must be at the bottom. All reports of the condition of the trade are discouraging. In spite of the greatest care on the part of shippers, reports continue of coal on track. Such coal seldom brings more than enough to pay the freight.

It seems likely that if the railroad men accept lower pay there must be some move to cut down miners' wages also, for that would bring in many men who are now idle and who will remain idle till all wages are in line, so that business can go ahead on an even keel.

Bituminous prices remain weak; $3.25@$3.50 for Youghiogheny gas

lump, $2.75@$3 for Pittsburgh and No. 8 steam lump, $2.25@$2.60 for all mine run and $2 for slack.

Anthracite—Supply is increasing and demand is dropping off, so that a surplus has already appeared. Consumers are quite indifferent to the market. The announcement of one company that it will sell at a 50c. reduction for the present has hurt the demand, for it is taken for granted that the others will soon come down.

Failure of the leading anthracite companies to make uniform prices has been observed practically all winter. The difference has not been large, but it gives the consumers opportunity to look for still more of the same thing. Then the city retail trade is getting to be cut up badly by the appearance of new and strong dealers, who are bound to get trade if they have to cut prices to get it.

Lakes trade is getting into shape. So far three of the companies with water docks have taken tonnage and three or four cargoes have been loaded already. It is not common to route this coal or to make any rates until about sailing time, which is likely to be as late as possible on account of the failure of iron ore to move yet. Vessel owners are getting very anxious for they could sail now. Yet there is so little business in sight that they are holding back and making no move to fit out their steamers.

Coke — Jobbers get a little coke trade at bottom prices and do not look for more right away. Quotations remain at $5.75 for 72-hour foundry, $5 for 48-hour furnace, $4 for low grades and stocks and $6 for domestic sizes, to which add $3.64 to cover freight.

HAMPTON ROADS

Stocks Accumulating — Prices Firmer —Business Is Slow.

Business continued slow during the past week, with little coal on hand and waiting vessel tonnage somewhat reduced. Stocks, however, appear to be accumulating, especially at the Norfolk & Western and Chesapeake & Ohio piers. Prices are somewhat stronger, low-volatile pools selling for $6, with other pools, for which there has been slight demand, selling for $5.

The situation at the three coal exchanges as of March 17, was as follows:

C. & O. piers, Newport News—	
Cars on hand	2,637
Tons on hand	131,350
Cars dumped March 1 to 16, inc.	2,332
Tons dumped same period	190,910
Tonnage waiting	3,800
Virginian Ry. piers, Sewalls Point—	
Cars on hand	1,008
Tons on hand	50,400
Cars dumped March 1 to 16, inc.	2,695
Tons dumped same period	134,749
Tonnage waiting	10,850
Tons on hand outside pool	16,150
Cars on hand outside pool	323
N. & W. piers, Lambert's Point—	
Cars on hand	3,294
Tons on hand	153,615
Cars dumped March 1 to 16, inc.	2,919
Tons dumped same period	162,763
Tonnage waiting	2,449
Total tons dumped March 1 to 16, inc.	418,422
Total tons dumped week ended March 16	183,629

Canada

TORONTO

Market Very Quiet—Plentiful Supplies on Hand — No Improvement in Industrial Situation.

Due to the exceptional mildness of the season the coal trade continues very quiet. Dealers are merely marking time, orders being few and for small lots. The yards are well stocked with all grades as shipments are coming in considerably in excess of the demand.

So far the industrial situation shows little noticeable improvement, the call for bituminous being consequently very light. Quotations are as follows:

Retail	
Anthracite egg, stove, nut and grate	$16.90
Pea	15.40
Bituminous steam	11.50@$12.25
Domestic lump	13.25
Cannel	17.00
Wholesale, f.o.b. cars at destination	
Three-quarter lump	8.00@ 9.00
Slack	6.50@ 7.00

Northwest

MINNEAPOLIS

No Buyers in Market—Fair Carry-Over to New Season—Delayed Seasonal Program May Prove Serious — Opening Price Indications.

"Desperately dull" describes the coal market in the Twin Cities. There has been no life to the market at any time since Dec. 1. Buying has been upon a restricted scale. No one has felt that he had to buy at all, and so could always take his time, with the full knowledge that whenever he was ready to buy there would be ample coal waiting for his attention.

Now come some predictions that the buyers' reign may be short. Some fear a return of car troubles which would speedily bring about the same situation that existed before. The mines are now working only two or three days a week for lack of an outlet, and in a rush of buying would be unable to do any more because of inability to get cars to move additional tonnage.

Should any such thing prove true, there is very little coal in the Northwest upon which to draw. The docks have hardly more than 2,000,000 tons of bituminous on hand, including railroad coal. On a falling market this tonnage is large, but it is scattered over twenty or more docks, and would not last long in a rush of orders. It would prove a very short time from a surplus to a shortage, in the event of any serious tie-up of transportation. On hard coal, there is hardly any remaining, and any rail trouble would leave the Northwest in as bad shape as it has ever been.

The opening prices of the new season do not seem to have been definitely intimated though many assume that they will not be far from the present basis on soft coal, while anthracite is likely to show the usual 50c. reduction for summer, with a 10c. per month advance during the summer. There is a determined effort on the part of consumers to force lower prices. But this is easier said than done. There does not appear to be any vulnerable point accessible at this end of the market line through which any reduction can be achieved. Refusal to buy until the weather compels will have no effect upon prices, since that is what is expected, being the customary move on the part of buyers.

MILWAUKEE

Coal Market Dull—Demand Is Very Light—Further Cut in Soft Coal and Coke Expected.

Demand is light, and is bound to grow less from day to day, as the season advances, unless unusual weather conditions develop. The yards retain good stocks of bituminous, and there will be coal held over from what were considered deficient stocks last fall. The supply of anthracite, Pocahontas, Illinois and Indiana coal by rail is more than sufficient to meet all needs.

Prices are held without change. A further cut in soft coal and coke is looked for about April 1. There is some speculation as to the future of anthracite, but the general impression is that there will be no change from present figures, except, perhaps, the usual drop of 50c. at the beginning of the season, as a bait for early orders.

The quality of anthracite sold here continues to excite criticism. Coke piles at the byproduct and gas plants are growing fast, and there is a glut of this class of fuel.

Inland West

CHICAGO

All Markets Are Inactive — Delay in Buying Will Intensify Later Demand.

Developments very clearly show that the public does not wish to buy coal at this time at any price. Retailers appear to be contented with the supply they have on hand, while the manufacturers are in a state of complete inactivity. Another condition that has tended to affect the market adversely was the rumor that the stock yards would probably close down, thus throwing a very substantial tonnage of screenings on the open market.

Dealers are all of the opinion that what business there is to be had is going to be very light and very hard to get until late in August. They are moving practically no coal and what little they are sending out of their yards is going in very small lots. The public is disinclined to buy until it is absolutely necessary, or until they are frightened into buying coal on account of an expected car shortage, etc. For the sake of the public, we hope that they become frightened into buying coal before the middle of the summer,

because if they delay too long the chances are they will have to pay a great deal more than they can purchase it for today.

The buyers of steam coal are frankly puzzled. There has been no betterment in the industrial situation and they do not know when to expect an improvement. As a result, their purchases are being made in a hand to mouth way and although some of them see an opportunity to buy coal at a reasonable figure, their finances will not permit of them taking advantage of the situation.

Current anthracite prices are as follows:

	Line Companies.	Independents
Egg	$6.34	$6.34@$7.41
Stove	6.56	6.56@ 7.41
Nut	6.65	6.65@ 7.41
Pea	5.22	5.22@ 6.21
Buckwheat	3.76	3.79

COLUMBUS

Spot Market Quiet—Contract Inquiries Numerous — Lakes Trade Is Slow — Production at Low Ebb.

All grades are suffering from inaction with the possible exception of screenings which by reduced domestic production has gained some strength.

There is considerable speculation as to contracting and producers have received many inquiries for prices. But few contracts have been closed as both the buyer and the seller are loath to enter into agreements under present unsettled conditions. Railroads have asked for bids on certain tonnage but these inquiries are mostly to obtain market information. Large users still have considerable reserve stocks and are not inclined to buy. Buying in the open market is being followed for current needs.

The Lake trade is not showing much strength. Some producers who control their own docks have loaded a few bottoms to be moved with the opening of navigation. Contracting for Lakes tonnage is slow and the question of grade enters into this phase of the business.

Shippers are demanding lump and are not disposed to contract for mine run. Consequently the business is at a standstill and will not show much activity until conditions change materially. A considerable tonnage is being carried over on the upper docks.

Domestic trade is dead in every particular. Consumers are only buying what they need for the present and are disposed to wait until they are driven into the market. Dealers' stocks are large and will not need much replenishment. Retail prices probably can go little lower. Hocking lump retails $7.50@$8, while West Virginia splints sell $8@$8.50. Pocahontas sells $10 @$10.50.

DETROIT

Demand for Steam and Domestic Very Feeble—Receipts Are Not Burdensome.

Bituminous—Rather than attempt to force bituminous coal on indifferent or unwilling buyers, wholesalers feel the wiser course is to adopt a waiting attitude, with full confidence that a better buying demand will develop within a few weeks.

Though reports of improving conditions in industrial lines are becoming more frequent, the transition apparently is to quite an extent a matter of sentiment. Various automobile companies, however, have resumed production on a moderate scale and probably about 1,000 men daily have been taken back at work in factories in and around Detroit during the last six weeks.

Prices quoted as the nominal basis of contract negotiations are about as follows: Lump from Ohio $3@$3.75, mine run $2.60, slack $2.25. West Virginia 4-in. lump $4, 2-in. lump $3.75, egg $3.50, mine run $2.75, slack $2.25. Smokeless lump $6, mine run $3.75, slack $2.25.

With a large proportion of the mines closed while others are operating only to the extent necessary to fill orders, shipments of bituminous arriving in Detroit are far below normal. Jobbers say there is little free coal to be found on tracks.

Anthracite—As in the case of bituminous, the demand for anthracite has flattened out to unusual thinness. Consumers are buying in half-ton lots.

ST. LOUIS

Unusually Quiet Market—Demand Only for Steam Sizes — Frisco R.R. Entertains Bids.

In St. Louis business is unusually light. There is no domestic tonnage moving. Such of the larger sizes as are moving are mostly for steam. There has been a shortage of steam coal in the smaller sizes, but this is accounted for by the fact that the mines are not working on account of the congestion of "no bills" of lump and egg.

It is evident at this time that the tonnage of anthracite in this market will be unusually small this year on account of the price. It is likely that coke will largely supplant both anthracite and smokeless coals.

There has been no change in retail prices. Demand is sluggish on account of the summer weather of the past week or ten days.

The Frisco R.R. on March 8 sent out requisitions for contracts for the coming year on Standard nut minimum 2,100 tons weekly, maximum 4,200 tons; mine run, minimum 3,600 tons weekly, maximum 7,200 tons weekly, and southern Illinois mine run, minimum 1,800 tons weekly, maximum 3,600 tons weekly. Standard coal for delivery at St. Louis and southern Illinois for Chaffee, Delta, St. Genevieve or other nearby connections. Bids were opened on March 21.

CLEVELAND

Movement to Northwest Provides Only Stimulus to Quiet Market—Some Boats Already Started — Spot Prices Firmer.

Bituminous—Movement to the lower ports has injected the first real show of activity into an otherwise stagnant market situation. For some time railroads have been loading Lake boats in co-operation with shippers. At the present time all berths available for loading at Huron, Ashtabula, Toledo, Cleveland and Lorain are being filled with cargo coal.

H. M. Griggs, manager of the Ore & Coal Exchange, has granted shippers nearly 50 permits for Lake shipping. The superintendent of car service of the Wheeling & Lake Erie R.R. has informed all coal operators engaged in Lake traffic that the Interstate Commerce Commission has granted permission to cancel the Lake coal demurrage tariff until May 1.

The early coal movement to the Lake is considered a favorable development in the market, although some doubt is expressed as to whether it will broaden sufficiently to result in any far-reaching benefit. The Lake movement calls for prepared sizes which will create a proportionately large amount of slack. It is possible that this slack may become a drug upon the market unless industrial activity quickens. Some increase in operations at automobile and steel mills is reported, but this is not extensive as yet.

Production in the Ohio fields is not declining, but seems to be holding its own. A slight stiffening of spot prices for slack has occurred in the last few days. Slack quotations range $1.75@ $2. Receipts of bituminous coal during the week ended March 12 were some 200 cars less than the preceding week, amounting to a total of 1,292 cars; industrial 896 cars, retail 396 cars.

Anthracite and Pocahontas—Although there is a sharp contraction of buying for heating purposes prices remain unchanged, following their recent readjustments downward. Retailers report that they are receiving many orders for half-tons, buyers being disinclined to buy beyond the needs of the next few weeks. One large retailer is turning down all less than one-ton orders.

Retail prices of coal delivered in Cleveland are:

Anthracite—All grades, $14.50.
Pocahontas—Shoveled lump, $11.40; mine run, $10.30.
Domestic Bituminous—West Virginia splint, $10; No. 8 Pittsburgh, $8.75; Cannel lump, $12.15.
Steam Coal—No. 6 and No. 8 slack, $6.10; No. 6 and No. 8 mine run, $7; No. 8 ¾-in. lump, $7.25.

CINCINNATI

Retail Prices Drop — Industrial Situation Weaker—Spot Market Inactive.

Slight improvement in the retail market was noted during the past week. There was practically no change in the wholesale trade, the market for steam coal being very quiet. Dealers see very little hope for an early change in this regard.

While some plants are at present operating part time, there are a few manufacturers who have been operating for several days each week, who because of the lack of orders are contemplating shutting down their plants entirely within the next week or two.

"Barely existing" is the way wholesalers describe the present condition of the market.

Bituminous lump was quoted about $4 per ton at the mines, nut and slack at $3.50 and egg at prices ranging from $2.75 upward. Pocahontas lump ranged around $5.75, and mine run was quoted $3.50@$4.

A reduction of 25@50c. was noted in the retail prices. Bituminous lump was $8.50@$8.75; mine run, $8.25@$8.50; smokeless lump and egg, $10.50; mine run, $9@$9.50; anthracite egg, $15@$16.25; domestic egg coke, $14.50@$16.

South

LOUISVILLE

Prices Firm — Demand Unchanged—Lakes and Contract Markets Inactive.

Prices have been reduced so close to production costs that they are on approximately the same basis, with very little range between prices in any one field. Gas coal is in such good supply that it no longer carries any premium.

Mines are operating about two days a week. Considering that when demand was good, car supply was short and many mines were not doing better than two days a week, actual operations in many cases are as heavy as they were.

There is hardly a fair demand, the retail trade picking up a few fill-in orders, while jobbers are scalping an order here and there. Principal quotations are shown in the Weekly Review.

Some operators are figuring on an early Lakes movement due to low prices and possible car shortage or labor troubles later on, while others are of the opinion that the real movement will probably start as late as June.

The fact that contract prices are about 33⅓ per cent higher than spot, with May delivery about 25c. premium over spot, indicates that operators expect a much better movement or else they are not willing to take chances on having to fill contracts at present spot prices. The general feeling is that prices will improve with the season, as was the case after the Armistice.

Southwest

KANSAS CITY

Prices Firm—Steam Demand Stronger—Strike Threatens Further Consumption Decline.

Prices have changed but little in the past week. Arkansas lump remains at $6, mine run is $4.50, slack, $3,50@$4; Kansas lump is $5.50, mine run, $4.50, slack, $3.75; North Missouri lump is $4.50, mine run, $4, washed slack, $4.05, raw slack, $1@$3.15, depending on quality.

Demand for domestic grades is practically dead which is causing a shortage of steam sizes but as yet prices have not advanced. Storage price for Arkansas lump will start at $6 April 1 and advances are expected each month thereafter.

Packing houses, which purchase large amounts of steam grades in this territory, are faced with a possibility of a strike of employees in the event of a reduction in wages or increased working time is insisted upon by the packers. This would materially reduce consumption and further add to the extremely dull condition in the Southwest coal industry.

West

DENVER

Production Lowest in Four Years—Storage Season Expected to Stimulate Trade.

Production touched the lowest level of the winter during the week ended March 5, when 131,510 tons were mined of a possible full-time output of 260,182 tons. "No market" caused a lost production equivalent to 43 per cent.

In the face of this discouraging situation operators are working their mines part time, very few closing down entirely. The general belief is that the storage season which sets in April 1 will bring relief through stimulation of orders on a little lower price scale.

Retailers are not as optimistic. Figuring on an expected basis of $6.50 at the mine Sept. 1, bituminous lump will cost 10c. more if bought then than it will be if bought in April and carried until July, or will be no cheaper if carried until August.

The retailer does not want to stock up this summer, knowing that prices probably will remain firm and increase as the summer wears on, but feeling that the mine price over a year ago is not sufficient to afford him any real inducement. He realizes that the operator can do no better, facing a high labor cost.

Another disconcerting element has set in, for one so-called illegitimate "newspaper dealer" has already started selling Routt County lump bituminous for $11 in Denver, which is 50c. cheaper than the April storage price of other concerns which handle a superior grade.

Lignite is generally steady at $3.50 at the mine, although the market is weak, due to an open winter.

News From the Coal Fields

Northern Appalachian

PITTSBURGH

Production Stationary — Lake Trade May Check Decline — Spot Market Easier — No Contracting.

Coal production has been approximately stationary for a fortnight, at about 40 per cent of mine ratings, and there is a possibility that the decline is now ended. Much, however, will depend upon the stimulus of Lake trade, as some assistance from that quarter will probably be needed to maintain the present rate.

It is recognized that there will be no heavy shipments in the Lake trade prior to about July 1, on account of stocks in the Northwest as well as Lake shipping conditions, but a moderate movement is hoped for. The ore movement down the Lakes is bound to be light in the fore part of the season.

Sales of spot mine run steam coal at under $2 are less uncommon than formerly, and here and there a case is reported that indicates the operator made the sale in regular manner and not as a result of being unexpectedly caught with coal on track accumulating demurrage. The average operator is not content to sell at less than about $2.50.

No approach to active negotiation of contracts for the new coal year has occurred, except perhaps for gas coal, and it looks as though consumers in general will buy in the spot market when present contracts run out.

The spot market is quotable $2@$2.50 for steam mine run, $2.50@$2.75 for gas mine run and $2.75@$3 for screened gas. There is no market at all for byproduct.

CONNELLSVILLE

Some Further Wage Reductions—Spot Coke Easier—Production Still Declining—Contracting Inactive.

Although several smaller interests have quietly made wage reductions, the majority of operators are committed to the policy of awaiting action by the H. C. Frick Coke Co., which has always taken the lead in wage scale changes. Action by the Frick company may occur when the Steel Corporation makes a general change in wages at its plants, probably in the fore part of April.

It is perhaps on account of wage reductions that standard grade furnace coke has become readily available at $4.25 to consumers, while some operators will sell at $4 to brokers. Foundry coke is a shade easier as some can be picked up at $5.25. There is a moderate buying of spot carloads of foundry coke, reflecting the existence of few contracts rather than anything like normal consumption. Contracts are entirely neglected in both furnace and foundry coke.

Merchant production is so low that it is hardly trending to any lower level,

but with the rapid decrease in the Steel Corporation's operations, following the decrease in the past few months by the independent steel interests, there is promised further decline in the furnace oven output. The Carnegie Steel Co. has made a new record, in blowing out 13 blast furnaces in one week, reducing its number active to 25, against 48 in January.

The spot market is quotable $4@$4.50 for furnace and $5.25@$6 for foundry, with contracts nominal at $4.75@$5 for furnace and $6 for foundry. The *Courier* reports production in the week ended March 12 at 83,310 tons by the furnace ovens, and 25,490 by the merchant ovens, making a total of 108,850 tons, a decrease of 7,530 tons.

UNIONTOWN

General Wage Reduction Contemplated —Spot Market Very Quiet — Trade Awaits Return to Normal.

Tangible evidence of any improvement in the coal and coke industry remains lacking, but operators and trade observers have not departed from their policy of optimism in viewing the trade readjustment. There appears, however, unanimity of opinion that the worst stage of depression has passed and that the future will show a gradual return to normal.

Since no other operator has followed the lead of W. J. Rainey, Inc., in reducing the wage scale it would now appear that the remainder of the independents will wait until action along those lines is taken by the Frick company, U. S. Steel fuel subsidiary. The fact that the Rainey reduction met with neither direct nor indirect opposition reflects the attitude of the workers as accepting the inevitable with as good grace as possible.

The coal market continues to record only stray sales and quotations show little change. Some steam coal has been sold at $1.85@$2, and byproduct is quoted $2.50@$2.75, but hardly sufficient sales in that grade are made to establish a market. Furnace coke is practically off the market, but in its place heating coke is being sold in odd lots at $4@$4.50, while foundry coke is quoted $5.75@$6.25.

EASTERN OHIO

Lakes Tonnage Aids Production— Other Markets Inactive—Lakes Demurrage Tariffs Postponed—Prices Firm.

Stimulated by shipments to the Lakes, production for the week ended March 12 amounted to approximately 283,000 net tons or 44 per cent of the weekly potential capacity, a slight gain over the preceding week. About 358,000 tons of production was lost because of the "no market" situation. The output for railroad fuel account was increased during the week, carriers taking better than 50 per cent of present production. Although mines of association operators worked but 40 per cent of possible working time during the week, production was 52 per cent of the rated capacity based upon railroad ratings.

Railroads have suspended until May 1 their Lake coal demurrage tariffs, thus removing an obstacle which might militate against free movement of coal to the lower ports. Lack of orders would compel additional mine closings were it not for the bolster of Lakes demand, as industrial and railroad fuel markets are stagnant. Seven or eight boats are now lined up for cargo in addition to the 40 boats already loaded which will result in an aggregate amount of over 400,000 tons. About 30 per cent of this tonnage is from the eastern Ohio field.

There is little activity in the contract markets. Figures given out as a basis for 1921 contract negotiations are: ¾-in. lump, $3.50, mine run $3.25, and slack $3. However, in view of current prices, purchasing agents are reluctant to enter into agreements, preferring to take chances from day to day with spot coal. Prices in the open market remain unchanged about as follows: Domestic lump $3.25@$3.75, 1¼-in. lump, $3@$3.25, ¾-in. lump, $2.75 @$2.90, mine run, $2@$2.25, and slack, $1.75@$2.

CENTRAL PENNSYLVANIA

Mine Curtailment Continues — Much Unemployment — Market Is Extremely Sluggish.

With no relief in sight, the coal mining industry is in a deplorable condition. The Pennsylvania Coal & Coke Co. with 34 mines, mostly in Cambria County, has but three running and these on short time. The situation is the worst in many years and hundreds of miners are out of work.

Throughout the entire field, more than 65 per cent of the mines are closed daily. Operators are trying to convince consumers that it would be good business policy to place orders for coal now as surplus stocks are about used up and a rush of orders later would breathe a shortage and have the effect of increasing the price, but there is nothing doing. Production is now at the lowest ebb for many years and the suffering among miners is intense.

FAIRMONT AND PANHANDLE

Production Declines—No Life to Spot or Contract Markets—Freight Differentials Bar to Lakes Buying.

Fairmont

More mines were idle during the second week of March than at any time in recent years, about 300 being shut down in northern West Virginia. Only 50 mines in the Fairmont region were being operated at all. Not only was there no spot market but contract orders underwent a decline. Tidewater and Western business was virtually at a standstill and railroad fuel shipments were much less than normal.

The outlook for Lake shipments is not encouraging as there is apparently no prospect of securing relief from freight differentials on Lakes rates. So far there has been little or no coal contracted, either for railroad or general commercial use. Operators are declining to negotiate agreements at prices under $3@$3.25.

Northern Panhandle

Buyers and inquiries for spot coal were conspicuous by their absence. With demand so lacking there remained only a few contract orders, not sufficient to cause more than a third of the potential output of the region to be mined.

Middle West

INDIANA

R.R. Contract Negotiations Active — Industrial Resumption Slow.

Production is running around 325,000 tons per week or about 50 per cent of capacity. Bids on railroad contracts for the N.Y.C., Big Four, Santa Fé, Pere Marquette and others run $2.60@$3 for mine run and $2.85@$3.25 for lump, although there have been no contracts let as yet.

Screenings have improved materially and there is a ready market for that size around $2. Domestic coal is weak, Fourth Vein, $3.25@$3.50, Third, Fifth and Sixth Veins $2.60@$3. The revival among industries is coming slowly; however, clay products plants contemplate starting the middle of April. Stocks are large and there probably will be no great activity in buying for some time.

MIDWEST REVIEW

No Improvement in Industrial Situation — R.R. Contract Closed — Higher Prices Inevitable.

The week just passed stands out even amongst poor weeks, as a period of practically no activity so far as the coal industry is concerned. The weather has just about paralyzed the demand for domestic and the industrial situation is so unsettled and uncertain that very little steam coal was moved.

There is a very decided disinclination on the part of operators to make contracts. This is becoming more marked every day. The only large agreement we have heard of being made was closed a few days ago by some operators who have contracted with the Chicago & Alton R.R. It is said that three prices are on these contracts, the first price of $2.90 for mine run to apply for the first four months of the new year, beginning April 1. The price during the second four months will be $3 and during the last four months $3.10. It is the concensus of opinion of some of the big operators that the Alton will have cause to congratulate itself on this contract, and at the same time, it will be of some relief to the mines on this railroad.

Last week an error occurred in this column. It was said that the opening price of Franklin County lump, furnace and small egg, would be $3.50. This is a mistake, as the April price on this grade of coal will be $3.65 f.o.b. mines and during the next five months, beginning May 1, this price will increase at the rate of 10c. per month. Quite

wisely, no price has been set for the fall months.

Various railroad men say that their sidings are blocked with empty coal cars which are standing idle until the demand for fuel is once more felt. It is the personal belief of a great many operators that when the public once starts buying, the railroads will not be able to handle the business and it looks as if this opinion would be justified, as every day the coal production of the country is decreasing and the stock piles held by the various industries are also decreasing, slowly perhaps, but surely.

SOUTHERN ILLINOIS

Price Cuts Fail to Stimulate Buying—Screenings Stronger as Domestic Declines—R.R. Buying Bargain Lots—Suffering Among Miners.

Retrenchment continued last week in the Carterville field. Even with the new prices tonnage moved was short of expectations. Some mines are getting only two days a week although operations loading railroad fluel run up to four days. Screenings are in good demand at $2.25@$2.85. Mine run can be bought down to $2.75. Association mines will not produce coal unless the price at least covers production costs.

It is understood that the Frisco R.R. has been able to buy Carterville lump, egg and nut at $2.50 and that some railroads have been offered mine run at $2. Independent operators are asking $2.50@$2.75 for screenings, with less working time, however, than the association mines.

Working time is unusually poor in the Duquoin field with prices about the same as in the Carterville district. Mt. Olive field conditions are bad on account of railroads easing up on their contracts. Mt. Olive price has come down to $3 for domestic to the St. Louis market; outside price, $3.25.

In the Standard field the Belleville group continues to sell below cost apparently. Two-inch lump has been offered at $2.15, mine run, and nut and egg $1.75. Screenings are quoted $1.50 with an upward tendency due to better demand. As time goes on more mines continue to shut down and destitution among the miners is growing. Railroad tonnage is decreasing every week and the average working time is not more than two or three days.

The steam market looks good on account of the falling off in domestic demand and as the price of screenings and nut advances lump coal may be expected to come down. There is nothing encouraging in a tangible way in the outlook for the immediate future.

WESTERN KENTUCKY

Prices Firm — Industrial Demand Slowly Improving—Rate Decision Aids Operators.

Prices are rather firm as a whole, with demand showing some improvement. Mines average about two days a week. Industrial and railroad fuel demands are showing slow but steady improvement. Lump coal due to mild weather is off. Screenings are stronger than they have been.

It is claimed by western Kentucky operators that action of the Federal Courts in upholding the Interstate Commerce Commission, in the matter of interstate freight rates superceding intrastate rates in effect under the Public Service Commission in Indiana, will result in western Kentucky fuel again moving freely to points in competition with Indiana fields, which have been virtually cut off for several months, as a result of the low intrastate rates in Indiana, permitting movement at a ten per cent increase over old rates, as against a thirty-three and a third per cent increase on coal moving from Kentucky.

Middle Appalachian

HIGH-VOLATILE FIELDS

Freight Differentials Retard Lakes Agreements—Production Further Curtailed—Contract Market Unchanged.

KANAWHA

But few sales were made on a spot basis in the week ended March 12 and very little coal was being produced, owing to a continuance of the sluggish market. Comparatively few mines operated at all and even these were running not more than two days.

It is apparent that not many contracts will be negotiated before May 1. Buying for Lakes is inactive and unless the present differential is eliminated little coal wll be shipped from this region to the Lakes.

LOGAN AND THACKER

Logan production of 100,000 tons was one of the poorest since the present period of depression set in. Some increased production during the early part of the week was due to heavier contract shipments to Western automobile plants. Practically no spot demand existed. Slack coal was slightly strengthened owing to the lowered production of domestic.

Demand in the Thacker region was such as to hold production to the very minimum. The output was not much in excess of 30 per cent, the only coal moving being destined on contracts. As in other fields little contracting had been consummated as the coal year neared the close.

NORTHEASTERN KENTUCKY

Less coal was produced than at any time since the market began to fall. "No market" losses were placed at 82 per cent, representing 185,000 tons. Most of the mines were closed down entirely. Even those with contract orders were operated two days at the most.

VIRGINIA

Production estimated at 40 per cent represented what was left of contract business which was still somewhat better than in other high-volatile fields. Practically no spot market existed. Mines on the I.R.R. had a production equal to 42 per cent of potential capacity, representing a slight improvement.

LOW-VOLATILE FIELDS

Production Continues at Low Level—No Spot Demand—Lakes and Tidewater Markets Inactive—Contracting Is Slow.

NEW RIVER AND THE GULF

The week ended March 12 saw little variation in the Gulf production, the output being placed at 30 per cent, about 5 per cent in excess of that for the previous week. This was due to a slight increase in contract shipments, no improvement occurring in the spot market. Operators do not expect much contracting for the new coal year before May 1.

New River production averaged between 12,000 and 16,000 tons per day. Market conditions were unchanged with the exception of lump and egg, which were a trifle firmer. Contract-making was still in abeyance.

POCAHONTAS AND TUG RIVER

Pocahontas production was on about the same level as during the preceding week. Operators were able to find no outlet for any spot coal. This was especially true as to Tidewater. There have been numerous inquiries as to new contracts but few if any agreements have actually been signed. As a rule production has been vigorously curtailed and operators are simply marking time, awaiting the revival of demand.

Two days represented maximum working time of Tug River operations. There was almost a total lack of spot demand. Tidewater shipments were especially small and there did not appear to be any signs of early Lakes shipments, to judge from inquiries.

Producers and buyers are still deadlocked on the question of contract prices with an absence of demand as a contributing factor in retarding the consummation of agreements for the new coal year.

West

UTAH

Little Coal Moving—Prices Firm—Wage Reductions Not Contemplated.

Very little coal is moving and producers are merely marking time. Prices remain firm, however, and there is not likely to be any change for another six or eight weeks, if then.

Retailers report business as a little better this week. They are drawing on their storage coal which is getting very low. None of them seems willing to stock up for fear prices may take a sudden and unexpected drop.

The wage reduction which has taken place in the Northwest is not likely to be followed here, unless the move becomes national.

MINE And COMPANY NEWS

ALASKA

Ground has been broken for the Government's $250,000 coal washing plant at the Matanuska field. The plant will be accessible to private operators. New beds of smithing coal have been discovered near Mears. In the Matanuska field more than 250,000 tons of coal have been blocked out.

COLORADO

Safety conditions at mines of the **Colorado Fuel & Iron Co.**, in 1920 were better than for many years. There were fifteen fatal accidents and the total production was 4,151,220 tons, a production of 296,515 tons per fatal accident. The record for all other coal mines in Colorado was 146,628 tons per fatal accident. Eight mines of the company had no fatal accident either in 1919 or 1920. One mine lost no shift on account of underground accidents, fatal or non-fatal, for seven consecutive months.

Compensation insurance premiums paid by coal operators in Colorado were reduced March 1 from $5 per $100 of pay roll to $3.85 by the Colorado Industrial Commission. The new rate was approved by the commission after an agreement had been reached by insurance stock companies handling this class of insurance. The rate charged by mutual companies will be $4.60 per $100.

ILLINOIS

The highest coal production in the history of the country was moved in 1920 by the Rock Island R.R. system. The annual report shows that after the roads were returned from federal control the movement of freight cars per day was increased 6.3 miles, from 22.3 miles to 28.6 miles. The average load per car was increased 1.7 tons from 28.3 to 30 tons. Arrangements have been made to buy 50,000 new freight cars, 1,500 new locomotives and 1,000 passenger cars.

The Franklin Coal & Coke Co., of Chicago, operating two large mines at Royalton, has announced that one mine will be closed down for some time, until better conditions prevail in the market. The two mines are in rank with some of the largest in the state. Many other mines in the section are also ceasing operations indefinitely, partially for the purpose of making repairs and some on account of the dull market.

The Missouri-Illinois Coal Co., of St. Louis, has recently closed a deal whereby it has rights over a large tract of coal land south of Belleville at Wilderman Station. The property is an ideal location for a coal mine and sinking will probably be started there in the future. The deal entailed a transaction of over $50,000.

The **Groveland Coal Co.**, operating at Pekin, will sink a new mine near that place in order to take care of a new and large contract recently acquired. The location of the mine will be on the P. & P. U. R.R. Houses will be erected near the location and in all probability a town will be established in time to come.

INDIANA

The Victor Colliery Co. has filed notice of company dissolution under state laws.

The Grimm Coal Co., of Evansville, has incorporated under Indiana laws with a capital stock of $100,000. The directors are: Fred Grimm, Casper Grimm, L. E. Grimm, Oscar Birch and B. F. Zieg.

The American Coal Mining Co. of Brazil has increased its capital stock to $200,000, all of which is preferred stock.

Announcement has been made of the organization of the **Dugger Domestic Coal Co.** of Indiana. The company will do a general mining business.

The Walker Coal & Mine Co. of Fort Wayne, has completed its organization with a capital stock of $50,000. The directors are J. J. Voors, E. A. Walker and A. J. Lassus.

Word has been received in Indianapolis that the Supreme Court of the United States has affirmed decrees of the lower courts refusing an injunction to the **Lower Vein Coal Co.**, restraining the industrial board of Indiana from involving the compulsory features of the state workmen's compensation act. The company based its application for an injunction on four grounds: That sections of the act violated the new process clause of the constitution; the equal protection clause and two separate sections of the Indiana bill of rights. The coal company filed its suit in the Federal Court at Indianapolis and Judge A. B. Anderson held that the section in question was valid and the plaintiff appealed to the U. S. Supreme Court. The suit was filed in April, 1919.

Coal companies in Parke and Daviess counties are preparing to take over leases on more than 25,000 acres of coal land bordering on the right-of-way of the old Evansville & Terre Haute R.R., recently acquired by the New York Central. It is expected that this coal development will be started with the reconstruction of the E. & I.

Dering mine No. 8, in the Clinton field, shut down recently for an indefinite period, until there is an increase in orders. The stopping of this mine throws about 225 men out of employment. Three mines of the **Crown Hill Co.** made a similar stop.

A motion to dismiss the suit brought almost two months ago by James T. Dunigan of Cleveland against William Schrolucke of Indianapolis, Will H. Voslon of Bloomfield, Nicholas and Charles Goodman of Linton, the Linton Trust Co. and the **Rosehill Coal Co.** was overruled in Federal Court, March 10. The case grew out of a dispute as to the ownership of coal lands near Linton, for which the owner. Nicholas Goodman, gave two warranty deeds, one to Dunigan and the other to Schrolucke and the Rosehill company.

KENTUCKY

Announcements of developments indicate much increased activity during the present year, insuring the expenditure of large capital. Near Seco, on the main line of the L. & N., West Virginia corporations are making plans to develop about 200 acres of Elkhorn coal lands. A modern plant will be put in. At Thornton Creek the **Elkhorn Colliery Co.** will make extensions. Just out from Blackey, the **Eden Coal Co.**, with offices in Whitesburg, will soon begin shipping coal from a modern plant. **The Elk Creek Coal Co.**, just below Blackey, will soon be in readiness to begin shipping coal. In the same section the **Consolidated Fuel Co.** is making a number of expansions. Their output will be easily doubled before the end of the year. **Nat B. Sewell**, of London, and others are to develop several hundred acres just below Cornettsville near the Perry County border.

The Winchester Coal Co. has a lease on about 200 acres in the vicinity of Emma, and plans for immediate development work. A complete coal-mining plant will be installed, including tipple, machine shop, forge shop and other mechanical buildings, with power plant for general operation. The company has also secured options on adjoining coal lands for later development. It was recently organized with N. M. White, Jr., as president, and W. D. Judy, secretary and treasurer.

The Bailey-Ferguson Coal Co., recently organized with a capital of $200,000, has acquired a tract of land totaling about 1,500 acres. The property will be developed and a coal mining plant installed with aggregate capacity of about 1,000 tons per day. A power plant will be constructed at the property. J. G. Bailey is president; S. C. Ferguson is vice-president, treasurer and manager.

The Western Kentucky Coal Traffic Bureau at a recent meeting in Louisville discussed the status of appeals pending before the I. C. C. for lower rates to Arkansas, Atlanta and the lower peninsula of Michigan, with intervening petitions entered by the Illinois Coal Operators' Association, Illinois Coal Traffic Bureau, Illinois Coal Trade Bureau and the I. C. R.R.

MARYLAND

W. D. Althouse of Philadelphia, who has large coal interests in the Georges Creek region, has purchased about 500 acres of the old Fort Pendleton tract, near Gorman, on the Western Maryland Ry. at the town of Mason, and has already begun mining.

Increase in its capital stock from $300,000 to $2,000,000 is planned by the Georges Creek Coal Co., of Lonaconing, together with incorporation, by which the name will be changed to **Georges Creek Coal Co., Inc.**

MINNESOTA

A test is being made at the power plant of the Minnesota state capitol building in St. Paul, to use pulverized peat for fuel. It has been used in Minneapolis during the winter in a downtown office building. A new company is just being formed by the same interests which compose the **Hennepin Atomized Fuel Co.**, of Minneapolis, to put in a plant for St. Paul, similar to the one in Minneapolis.

MISSOURI

Mine No. 3 of the **Big Creek Coal Mine Co.**, employing 200 men, has been shut down indefinitely because contracts held have been cancelled. Mine No. 1, employing 400 men, will be operated part time.

NEW JERSEY

Fire recently destroyed a large portion of the plant of the **International Coal Products Co.**, Irvington, with loss estimated at about $90,000, including machinery.

OHIO

Two suits for damages aggregating $58,000 were filed in the Franklin county courts last week by the **Ohio Consolidated Coal Co.**, against **Harry B. Summers** and the **Lexi Coal Co.** as principals and the American Guaranty Co., as security for alleged breach of contract for the delivery of a certain tonnage of coal.

Railroads in the Columbus district are preparing their equipment for the opening of the Lake trade. The H. V. Ry. Co., is receiving a large number of coal cars which have been repaired in outside shops, where 1,750 cars were sent for repairs. The shut-down of a large number of mines has caused an excess of coal-carrying equipment so time is now being taken to make minor repairs.

John Stronjek has been rendered a verdict of $1,225 against the **Cambria Collieries Co.** The plaintiff alleged that the defendant company had removed coal unlawfully from under his premises.

The Lick Run Coal Co. has been chartered with a capital of $200,000 to develop mines in the Hocking Valley field. The incorporators are D. R. McGill, P. J. Mertz, R. Green, M. A. Krieg and N. E. Green.

Quite a few of the mines in the Moxahala district are being re-equiped electrically since the power lines of the Ohio Power Co., Newark, have been extended into that field. Operators are taking advantage of the lull in the demand to make the improvements.

A bill has been introduced in the Ohio General Assembly designed to stop profiteering in coal. If the bill should become a law there is just one penalty that can be imposed and that is imprisonment for a period of not less than 30 days nor more than a year. The bill limits retail profit to 30 per cent above the cost at the mine, plus the freight charges and war tax. Only three agencies are permitted in the selling of coal, the producer, retailer and the consumer. No commission is permitted for brokerage and the product of the mine must go directly to the retailer. The only middleman allowed under the bill is the retailer. The measure also provides that all dealers in coal must register with the auditor of the county in which they do business and pay an annual license fee of $2 when a certificate will be issued giving the right to retail coal for one year.

The Vocational Schools for Miners, in Bellaire, Martins Ferry, Neffs, Rayland and Bridgeport will take up the study of "Mine Ventilation." Sessions are held evenings either in the public graded schools or high schools at the points named. The course in mine ventilation will continue until the first of July, when the session will close. The complete course extends over a period of four years and it is said a graduate is capable of filling any mine position.

The Stover Coal Co., of Newark, has been incorporated with a capital of $34,000 to mine and sell coal. Incorporators are T. McKenna, J. Wildman, F. C. Bausch, Perry Ray and F. B. Wurm.

Many Ohio coal operators are backing the movement started by the Ohio Board of Commerce to secure amendments to the workmen's compensation law in the Buckeye State. Operators believe that the rate on coal mining and work about mines is entirely too high and that they are charged an unreasonable sum for the insurance. As compared with other states the rate is from 50 to 100 per cent higher, without any apparent reason. A large number of the operators favor a plan whereby private insurance companies can enter the field, under the jurisdiction of the Ohio Industrial Commission and thus have competition in the field.

The Ohio Consolidated Coal Co., which has headquarters in Columbus is making extensive repairs to its mine located at Wirbren. Entries are being driven to reach new areas and additional machinery is being installed. This mine will be in shape for operation with the opening of the Lake trade.

The annual stockholders' meeting of the **Sunday Creek Coal Co.,** held in Columbus resulted in the re-election of the former board of directors. J. S. Jones is chairman of the board and president; George K. Smith, secretary, and C. C. Cook, treasurer. These officers with H. B. Arnold and W. E. Tytus constitute the board of directors.

Mine No. 5 at Murray City, owned by the **Pittsburgh Coal Co.,** and operated through the Columbus office has been closed down for about four weeks for necessary repairs. No radical repairs are being made but the changes consist of arranging the power house to better advantage and to making extensions of the tracks and entries.

PENNSLYVANIA

Commencing with February shipments, coal traffic through the locks of the Monongahela River are measured by the ton unit instead of the bushel as heretofore. The traffic for that month was 840,200 tons or 22,111,000 bushels, 7,121,000 bushels under the January shipments.

One fifth of the coal tonnage produced in the **Twenty-first Bituminous District** is credited to the Vesta Coal Co., according to the annual report of Mine Inspector C. P. Byrne. Total tonnage in the district was 8,043,690 tons of which the Vesta company produced 3,885,036 tons.

The entry for record of the deed of the **Stauffer-Quemahoning Coal Co.** to the **Barnes-Quemahoning Coal Co.,** for the holdings of the former at Listie, shows that the consideration in the transaction was approximately $912,000.

A state-wide referendum of Chamber of Commerce members is being taken to determine the attitude of business men on the proposed new taxes on anthracite and bituminous coals.

A barge with a capacity of 1,400 tons has been launched at Brownsville to carry coke from the Pittsburgh Steel Company's Alicia plant to its steel mill at Monessen. The barge was commenced by W. Harry Brown before he sold the Alicia plant to the steel company and was finished by that concern. It displaces six feet nine inches of water and cost approximately $200,000. It is the largest barge in the Monongahela River trade.

The Pittsburgh Coal Co., for the year 1920, made a very favorable showing, though labor troubles and car shortage reduced the tonnage to 12,348,386, a decrease of 1,504,055 tons, from 1919. The results of operations compare as follows:

	1920.	1919.
Gross receipts	$48,596,589	$37,303,131
Net earnings	14,302,505	8,090,896
Depletion, depreciation, interests, etc.	3,369,789	3,531,181
Balance	10,932,715	4,559,716
Dividends and taxes	4,175,366	4,896,736
Surplus	6,884,197	.....
Deficit	.....	337,020
Total surplus	$30,369,829	$23,485,632

T. J. McClerman of Uniontown, has closed a deal for the purchase of 412 acres of the Smith Creek block coal in Greene County, from John H. Strawn, receiver of the Farmers and Brovers National Bank of Waynesburg, for a consideration of $92,-250.

J. Frank Dawson and **Taylor N. Dawson,** of Uniontown, have sold all the Sewickley, or Mapletown seam of coal on the Monongahela River front that lies between Big Whiteley and Dunkard creeks, including the Mapletown Coal Company's works, for $525,000 to **Senator John L. Hatfield** and associates of Morgantown.

The Fort Hill Coal Co., made up of Johnstown business men, has been organized to develop coal land in Somerset County and have holdings totaling 1,500 acres in the vicinity of Fort Hill.

The labor situation in the coal fields of northern Cambria County seems to be sliding between two extremes. **The Monroe Coal Co.,** with operations at Colven and Revloc are working five days a week. **The Pennsylvania Coal & Coke Company** at Hastings have closed down all mines, **The Jasa Hill Coal Company** plans to erect 250 houses at Flinton. Material for fifty of the buildings has been placed on the ground.

The Evans Colliery Co. is arranging for the immediate reopening of its No. 4 and No. 7 slopes. It is proposed to extend the operations to reach coal that could not be mined when the workings were first operated.

F. J. McClaren is planning for the development of coal property at Waynesburg, recently acquired. The acquisition includes a total of about 600 acres of land, with price reported at $225 an acre.

The Pittsburg Coal Co. has purchased about 51,700 acres of coal land in Morris Township, heretofore held by David M. Van Scyoc, Dunn's Station, and plans for early development of the property. A consideration of $15,535.80 was given for the lands.

The One Hundredth Annual Report of the Board of Managers of the **Lehigh Coal & Navigation Co.** to the stockholders for the fiscal year ended Dec. 31, 1920, has been made public. The net income carried to profit and loss amounted to $4,045,053.06.

UTAH

The Price Oil & Coal Leasing Co. is the name of a new corporation which has just been formed at Price. C. R. Marcusen is the president and A. E. Gibson secretary. The capital stock is $15,000.

The Lion Coal Co.'s holdings in Carbon County have been valued at $318,340.

Nita Laverne Butte, through her guardian, has filed suit against the **United States Fuel Co.,** Salt Lake City, for $20,000 damages for injuries alleged to have been caused last July when the girl was injured by a rock which was being blasted from the mine at West Hiawatha in Carbon County.

VIRGINIA

The Bundy Coal Co. has commenced development work on about 75 acres of coal lands in the vicinity of Johnson's Mill, and is considering the installation of considerable new equipment. A. N. Gilly is president.

WEST VIRGINIA

It has just been learned that the **Hutchinson Coal Co.** which operates on an extensive scale in the Harrison and Marion counties has added to its holdings to the extent of 200 acres of coal in the Pittsburgh vein, this coal land being on Simpson's Creek. There are said to be five or six different tracts in the acreage acquired.

The Commissioner of Chancery in the Circuit Court of McDowell County has allowed Colonel I. E. Tierney, $72,813.04 and the Flat Top National Bank $27,209.54 in the case of Col. Tierney against the **United Pocahontas Coal Co.** in which the plaintiff claimed to have been eliminated from his interest in the Zenith and Indian Ridge Coal Companies merged, as the plaintiff claimed unlawfully, into the United Pocahontas Coal Company. The case had been appealed from the circuit to the Supreme court and remanded.

Another large coal deal has been consummated in Cass district of Monongalia Count, the **Soper-Mitchell Coal Co.,** having purchased several tracts of Pittsburgh and Sewickley coal aggregating 380 acres for which the sum of $202,634.80 was paid. It is understood that the company will develop this coal in connection with its other properties in Monongalia County.

New equipment has been added to and installed at the mines of the **Diamond Coal Co.,** located on Scott's Run in the Monongalia field. Included in the new equipment are three short-wall coal cutting machines and two electric locomotives.

Provision having been made by the **Forest Coal Company** of Fairmont for additional directors, the stockholders of the company have elected to fill that post, James Christopher of Osage, W. Va. and F. E. Christopher of Morgantown, W. Va.

One of the big deals of recent months has just been consummated under the terms of which the **Guyan Collieries Corporation** has acquired from the Gilbert Creek Land Company and others a total of 6,700 acres of coal land in the Mingo and Wyoming fields, paying for this acreage a total of $300,000. The corporation plans development work only on 2,700 acres for the present, the other part of the property not as yet being within the reach of railroads.

In connection with the organization of the **Seminole Gas Co.,** a Detroit concern, capitalized at $150,000, it is learned that this company will open mines not far from Clarksburg, where 50 miners' houses will be built, an office and store building erected and the usual mining equipment installed.

A drift mine is being opened near Grafton by **R. L Marple.** As the mine to be opened is on the side of the Tygarts Valley River opposite the railroad it will be necessary to install a bucket conveyor system.

The Chesapeake Coal Co. is arranging for the immediate installation of machinery at its properties in the Barracksville section. The company has a tract of over 700 acres of land and will open a number of mines.

The Leckie Coal Co. has purchased about 2,800 acres of coal property in the Big Clear Creek district, and has preliminary plans under way for the development of a section of the land. Machinery will be acquired at an early date.

The Low Volatile Collieries Co. is planning for increased production at its plant. The company has recently increased its capital from $50,000 to $100,000 for expansion.

Although the coal business in the Morgantown district has been pretty well paralyzed by the slump in the coal market, indications are that the companies are making every preparation for an early resumption of business by putting their plants in the best condition. **The New England Fuel & Transportation Co.** is reported about ready to start work on 700 new houses at Lowesville on the Monongahela River R.R. south of Morgantown. **The Bethlehem Steel Co.** is building 50 houses at two of its mines. Most of the other companies are similarly active, repairing machinery or plant, or putting in new equipment. The 2,000 to 3,000 idle men in

the district are mostly loaders or such other men as can not be used in general repair work. There is no indication of a cut in wages, although poor workmen may find themselves without work when business is resumed.

Claiming that minority stockholders of the **Flat Run Coal Co.** had entered into negotiations with the **Wheyel Coal Co.** for the sale of the property to that company the Wheyel company has secured an injunction to restrain the sale of 1,500 acres of coal land near Mannington to a number of Morgantown coal people, including Ben Chaplin, Raymond Kerr, Perry Beaumont, M. L. O'Neil, A. W. Bowlby, E. F. Bowlby and others. The injunction was secured from the circuit court of Marion County. Although the sale to the Morgantown people was announced a short time ago, it has not been fully consummated and the injunction was secured to prevent this. The greater part of the stock of the company is under the ownership of D. S. Myers of Pontiac, Ill.

Coal land to the extent of 251 acres on the headwaters of Paw Paw Creek in Monongalia County has changed hands, having been purchased by **Charles Powell** of Fairmont from H. H. Rose and W. Kenneth Barnes, special commissioners. The sum involved in the transaction was $14,478.

BRITISH COLUMBIA

An inquiry has been ordered by the Provincial government into the cost of the production of coal on the coast of British Columbia, the cost of its transportation, screening and delivery by the dealers, the profits made by the collieries and the profits of the dealers. Alexander Henderson, K. C., a prominent lawyer of Vancouver, B. C., has been commissioned to make the investigation.

There is another development to the litigation between the E. & N. Ry. Co. and the **Granby Consolidated Mining & Smelting Co.** as to the ownership of coal rights in certain sections of the Vancouver Island railway belt. Recently a judgment was handed down that one of the two adjoining areas, the Dunlop estate, belongs entirely to the Granby company but that the other, the Ganner estate, in respect of the undersurface rights, belong to the E. & N. Ry. Co. It appears that one of the mine entrances in connection with the Cassidy Collieries is on the Ganner estate and the Court of Appeal has given permission to the operating company to use this approach to the workings located within its property. The Granby company states that if access to the company's workings was forbidden 1,700 people would be thrown out of employment and plant representing an investment of $19,000,000 would be closed down. The question of the ownership of the underground rights within the Ganner estate will be fought out in the courts to the final Court of Appeal; namely, the Privy Council.

Personals

Arthur W. Covert, has been appointed advertising manager for the Imperial Coal Corporation.

Phillip E. Thomas, treasurer of the Imperial Coal Corporation was in Boston and New York City recently.

David White, chief geologist of the U. S. Geological Survey, is delivering a series of lectures on fossil fuels at the University of Wisconsin.

N. H. Darton, of the U. S. Geological Survey, is making a geological study of the structure in Pennsylvania of the northern Appalachian coal fields.

Thomas K. Maher, president of the Maher Collieries Co. and also president of the Pittsburgh Vein Operators' Association of Ohio, has returned from an extended trip to the West Indies and Central America.

Michael Gallagher, general manager of the Wheeling & Lake Erie Coal Mining Co., spent a few days in Washington where he attended the Inaugural ceremonies.

The Reeves Coal & Dock Co., of Minneapolis, announces the appointment of **George W. McGill** as general sales agent, with offices at 712 Plymouth Building, Chicago. **L. L. Benjamin,** of the Minneapolis office, will be under Mr. McGill in charge of Northwestern sales, with offices in Minneapolis. Mr. McGill is regarded as one of the best coal men in the West. He started in the coal business 32 years ago, with the Clark Coal & Coke Co., at Peoria, as office boy, and worked his way up with that company for 24 years. Eight years ago he went with the Reeves company, and these two companies are all that he has ever been connected with.

C. W. Proctor, president of the Calumet Coal Co., New York City, has gone on a business and pleasure trip to Bermuda. He expects to be away about a month.

Fred Kerner, manager of the export department of W. A. Marshall & Co., New York City, who sailed on the Aquitania on Feb. 26 for Europe, was tendered a dinner the previous evening by the employees of Marshall & Co. When the Aquitania sailed the next morning a specially chartered tug bearing Mr. Kerner's fellow-workers and the members of his family, followed the vessel to Sandy Hook. Mr. Kerner expects to be away three or four months and during that time will make an extensive study of the export situation.

D. H. McDougall, president of the Nova Scotia Steel and Coal Co., has been appointed vice-president of the British Empire Steel Corporation, according to announcement made at the general office of the Dominion Coal Co., Glace Bay. His appointment places him as second in charge over the Dominion Iron & Steel Corporation, the Nova Scotia Steel and Coal Co. and the Halifax Shipyards.

F. W. McCullough of Huntington, who recently resigned as assistant district attorney for the southern district of West Virginia, has been named as a vice-president of the Buffalo-Thacker Coal Co., according to an announcement just made by L. R. Reese, president of the company.

C. H. Mead, president of the Mead-Tolliver Co. and other companies in the New River and Winding Gulf fields, broke down from overwork late in February. Mr. Mead had had much sickness in his family and among officials of the company in which he was interested.

E. P. Weddell, connected with the Weddell-Albright Coal Co. at Monongah, W. Va., was a recent visitor at Scottdale, Pa.

The Kanstine Co. of Buffalo, was represented in the Fairmont region recently by **E. J. Tart.**

Traffic News

In the complaint of the **Central Steel Co.,** the I. C. C. holds that the rate charge on coal from points in the Kanawha district of West Virginia to Massillon, Ohio, were inapplicable and unlawful.

The Old Ben Coal Corporation, of Chicago, in a complaint alleges unreasonable rates on rock or shale dust from West Frankfort to Christopher and Sesser, Ill.

In the complaint of the **Duquesne Coal & Coke Co.,** an I. C. C. examiner recommends that interstate rates on bituminous coal from mines west of Pittsburgh in the states of Pennsylvania and West Virginia on the Pittsburgh & West Virginia Ry., to points North and East be held to be prejudicial to the extent that they exceed rates from the Pittsburgh group by more than 10c. per ton.

In the complaint of the **Driscoll Coal Co.,** involving rates on coal from the Walsenburg and Trinidad districts to Pueblo, Colo., the commission has permitted the Union Coal and the Mark Coal companies to intervene.

Association Activities

Morgantown Coal Club

Some idea of the activities contemplated by the recently organized club, may be gleaned from the different committees appointed, announcement of which was made during the first week of March by President G. L. Rodgers. The personnel of such committees is as follows:

On Finance—W. E. Glasscock, R. L. Brock and W. A. Gadd.

On Membership—M. L. Taylor, S. F. Elkins and E. H. Gilbert.

On Publicity—Harry C. Ownes, C. M. Lyons and C. E. Gadd.

On Entertainment—Claude Scott, F. M. Lucas and C. E. Watson.

On Attendance—P. H. Keener, H. G. Hodges and Clarke L. Reese.

On Sickness and Distress—R. M. Davis, J. R. Blackburn and G. E. Smith.

On Sports—C. F. Sutherland, N. W. Brownsfield and R. H. Bowlby.

On Business Ethics—C. D. Jenkins, W. R. Harris and E. S. Baumbartner.

Rocky Mountain Coal Mining Institute

Greater efficiency in mine operation than is generally admitted centers in the fire boss, and an effort to determine whether it would be better to put him under state supervision, rather than company control, was started in the winter meeting of the Institute, held Feb. 25 and 26, in Denver. A committee was authorized to look into the matter and report at the summer meeting, which probably will be held in Glenwood Springs. The mine boss may take a risk that the fire boss deplores, although the latter generally is subservient to the decision of the former, according to a paper read by R. S. Morton. It was suggested that he be given as much liberty as a coal mine inspector under state direction.

D. A. Stout of Pueblo, chief engineer of the Colorado Fuel & Iron Co., read an interesting paper on the "Unwatering of the Rouse mine," the third in the Walsenburg district and the second of the company's in that district. Other technical papers were read by George A. Brown of Cumberland, Wyo., Robert Marshall and Sam Andrew of Farr; Robert McAllister of Trinidad, and Tom Ollier and Parley Potter of Tremont County.

B. J. Matteson, the president's industrial representative of the C. F & I. Co., presided, and later was succeeded as president for the ensuing year by Robert M. Magraw of Hiawatha, Utah. F. W. Whiteside, chief engineer of the Victor-American Fuel Co., Denver, was re-elected secretary and treasurer.

The operators visited a mine owned by John McNeil near Frederick, and while there witnessed a performance of the Oldroid mining machine. Fifty operators from Wyoming, Utah, New Mexico and Colorado attended the convention.

Coming Meetings

Nova Scotia Mining Society will hold its annual meeting April 5 and 6 in Halifax, N. S. Some interesting coal papers are to be presented.

The American Wholesale Coal Association will hold its annual convention in Washington, D. C., June 7. Secretary, G. H. Merryweather, Woodward Bld., Washington, D. C.

Canadian Retail Coal Association will hold its annual convention April 6 and 7 at the King Edward Hotel, Toronto, Ont., Canada. Secretary, B. A. Caspell, Brantford, Ont., Canada.

The International Railway Fuel Association will hold its thirteenth annual meeting at the Hotel Sherman, Chicago, Ill., May 24, 25 and 26. Secretary, J. G. Crawford, Chicago, Ill.

The National Coal Association will hold its next annual convention at the Waldorf Astoria Hotel, New York City, May 19 and 20. White Sulphur Springs hotel reservations have been cancelled. W. B. Reed, secretary, Commercial National Bank Bldg., Washington, D. C.

The American Society of Mechanical Engineers will hold its spring meeting May 23, 24, 25 and 26 at the Congress Hotel, Chicago, Ill. Secretary Calvin W. Rice, 29 West 39th St., New York City.

National Chamber of Commerce will hold its ninth annual meeting at Atlantic City, N. J., April 27, 28 and 29.

National Retail Coal Merchants Association Sixth Conference of Secretaries and Executives to be held at the Baltimore Hotel, Kansas City, Mo., May 15 and 16. For reservations address H. S. Mitchell, New York Life Bldg., Kansas City, Mo.

National Retail Coal Merchants Association will hold its annual meeting May 12, 13 and 14 at the Jefferson Hotel, Richmond, Va. Secretary, E. G. Gordon, Philadelphia, Pa.

The National Foreign Trade Council will hold its eighth annual convention May 4, 5, 6 and 7 at Cleveland, Ohio. Secretary, J. G. Hammond, 409 Park Bldg., Cleveland, Ohio.

Illinois Mining Institute will hold its spring outing the latter part of May on the Mississippi and Illinois Rivers, the boat leaving St. Louis for Peoria on May 26 and returning on May 28. Secretary, Martin Bolt, Springfield, Ill.